InterActivity

TOOLS + TECHNIQUES FOR INTERACTIVE MEDIA DEVELOPERS

FROM 7TH GUEST TO 11TH HOUR
Trilobyte's Interactive Dynasty

STOCK MEDIA
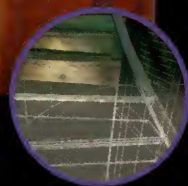### COMPREHENSIVE GUIDE TO 3RD PARTY AUDIO

INTERACTIVE STORYTELLING

PUZZLE DESIGN

ASSET MANAGEMENT

3D MODELING SECRETS

INTERFACE PARADIGMS

WEB SITE DESIGN
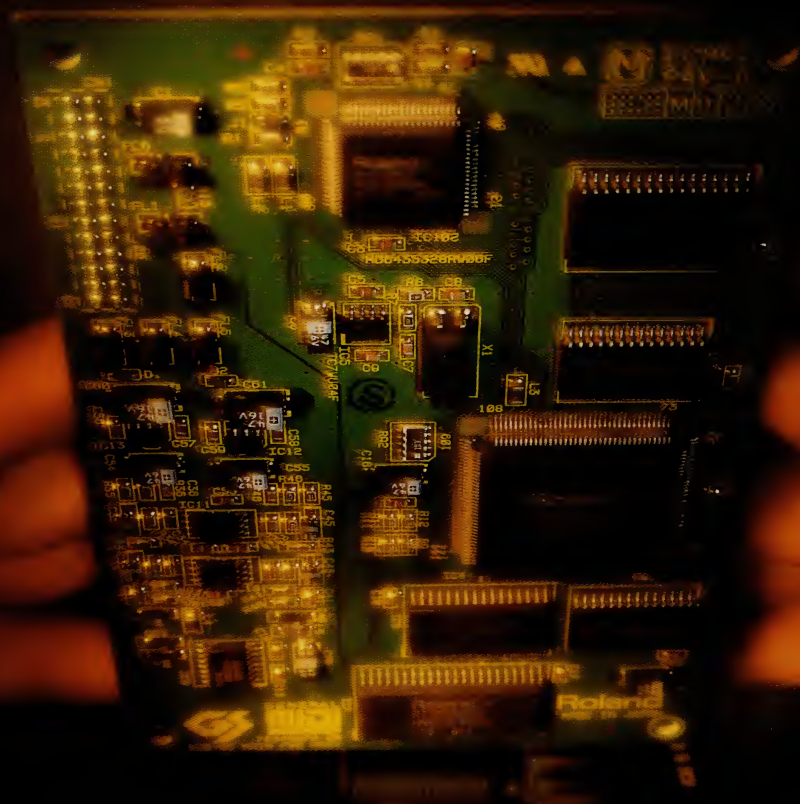### TRACK ACTIVITY ON YOUR SITE

INTERACTIVE VIDEO
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FEATURES

HOW-TO COLUMNS

60

DEPARTMENTS

Cover images courtesy of Trilobyte

FROM THE EDITOR

BIG HEADS

Most would consider it an occasion worth celebrating, but I knew we were in trouble. I'd just returned from an extended road trip — a couple days in Southern Oregon doing the research for this month's Mega Case Study on Trilobyte, one day home, two days in Chicago putting together another profile of an innovative development team (which you'll have to wait to read in a couple months), then a week in the Big Apple attending the Audio Engineering Society convention. I wasn't back in the office more than a couple minutes when John Ueland caught me in midstride.

"Hey, Dom. Can I go to New York to accept?"

Accept what? I thought, sensing impending doom (the disastrous kind, not my favorite politically incorrect game from id).

"The award, of course."

That's when I noticed the signs: Head the size of a high-altitude weather balloon. Giddy, self-satisfied smirk. Puffed up chest. Sure symptoms of . . .

"Didn't you hear? We won an Ozzie."

. . . winning some professional award or other. An Ozzie is a *Folio:* award — *Folio:* being a magazine about the magazine business. Like I said, an occasion worth celebrating. But with his head in such a swollen state, all I could think of was how our rookie art director intended to get through the door of his cube, let alone onto a plane to New York. Then I remembered that Lea Anne, our managing editor, kept a ready supply of #11 Exacto blades for just such occasions. You can never, after all, be too prepared.

It's not every year that you win a national award for Best Designed New Trade Publication. Considering *InterActivity* is John's first magazine — he spent years in the salt mine of our marketing department designing media kits and issue promotions while doing illustrations for our sister publications *Guitar Player* and *Keyboard* in his spare time — I figured he was entitled to both the bloated ego and the trip to the big city on the other side of the world.

And lest he think us ungrateful, kudos to *Guitar Player* art director Rich Leeds, who designed the overall look and feel of our premiere issue, a look and feel that Ueland has taken as a point of departure and attempted to improve with every new issue.

Readers have been vocal in their praise of our contemporary look and overall readability — something the boys really worked hard on. Congrats to both of 'em, burly egos and all.

• •

A number of luminaries in the magazine business will tell you focus groups are worthless when it comes to editorial content. Common wisdom, or so the studies and gurus say, is that readers never tell you what they want, because they don't know what they want until they read it. In other words, real magazines have real editors who have real vision that produces interesting content. Or something like that.

I say humbug to that. Reader involvement means a lot. It's one thing for us to force feed you with info about our favorite titles and Web sites, it's another for you to tell us what you'd like to read about in these pages. So how about it? Want to get interactive for a minute? I'd like to poll you folks on just what kinds of things you'd like to see us do case studies on. Consider it a reader's poll of sorts. We have plenty of such things planned, but we get very few if any requests. Send your requests to me at interactivity@mfi.com, along with a short description of why you think the title/Web site/whatever would make for interesting reading. If we agree, we'll try to get the inside story for you here.

Enjoy.

Dominic Milano
Editor

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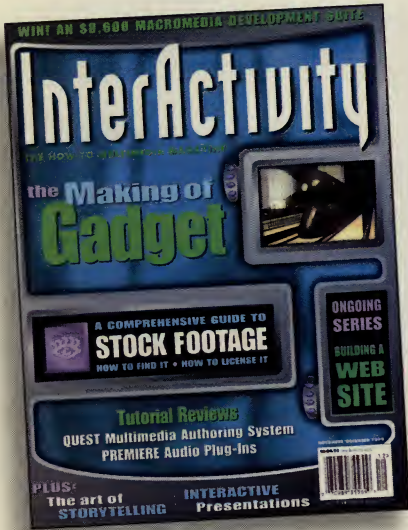
Stupid Stupid Stupid

We were deluged with email after "How to Put Together an Internet Web Site: Just Enough Unix to Get You Connected to a Server" appeared in our November/December '95 issue. Larry O'Brien's "Top 10 Unix Commands" defined the command pwd *as password. In fact,* passwd *is password. Larry knows. Trust us. Here's a sampling of what readers had to say:*

I just got the November/December '95 *Inter-Activity* and spotted the article about building a Web site. A good tutorial series for beginners on how to create Web pages and place them on a server is long overdue. As a network administrator and Webmaster, I spend way too much of my valuable time hand-holding users and explaining cross-platform related file handling problems that come up when attempting to move files from DOS/Windows into Unix.

While your article does a nice job defining the common problems, it falls short in explaining the solutions, and due to some fairly blatant misprints it will definitely cause additional confusion to anyone trying to follow it when attempting to put Web files onto a Unix server. I hope you don't mind some constructive criticism.

First off, in the Top 10 Unix command list on page 43, there are two serious errors. The command for changing passwords in Unix is passwd not pwd as shown in the table. The pwd command is valid but means "print working directory." Fortunately, it is specified correctly in the body text. It's only wrong in the table list.

Next, the command to create new directories in Unix is mkdir, not md as shown in both the table on page 43 as well as in the text of the article. Some sysadmins who have a lot of DOS users accessing a Unix machine may opt to create global command aliases so that users can use familiar commands on both platforms. If md works on your system to create new directories, it's because the sysadmin mapped it as an alias to the mkdir Unix command. This is definitely not the case for the majority of your readers.

The most common area where my Web users run into trouble is barely even mentioned in the article. It is the issue of properly setting file permissions. This is a totally foreign concept to virtually all PC/Mac users. The article glosses over setting the execute bit for script files, but it doesn't mention the need to set the file permissions explicitly for all of the other Web page elements. Failure to set file permissions for Web page objects properly will result in the Web server returning an "access denied" error. This is the single biggest problem I run into.

Many flavors of Unix default to setting file permissions to "no access" for "others" for any file placed on the system unless a gracious, non-security conscious sysadmin specifies otherwise. This means that when users place files in any directory on the machine, only they have read access. Anyone else (except possibly members of the same "group"), including a Web browser client, can't read the file unless the file's owner explicitly sets the file permissions for "others" to "read" with the chmod command. This little point was totally missed in your article.

Lastly, attempting to explain the CGI scripting file permission issue in an entry-level tutorial is pointless. No one writes CGI scripts on a desktop platform and then moves them to the Unix server. You just can't do it. Granted, technically you could write a Perl script or C source on a PC and then move the file into Unix. The problem is that you can't run your CGI Perl script or C code until it's loaded onto a Web server. Anyone who can write CGI scripts in Perl or C doesn't need a tutorial on how to move them onto a Unix machine.

I'll stop now. I don't mean to be too critical of your valiant attempt to help the informationally challenged newbies. I deal with it every day. It's just that incomplete instructions with misprints will ultimately create more confusion that sysadmins like me will have to deal with. I do enjoy your magazine. Keep up the good work!

John Kraft
David Larson Productions
sysop http://www.craftnet.org

In the first article I look at in my very first issue of *InterActivity*, I discover you have some remarkably un-clued writers and editors when it comes to articles about Web serving. Not promising. If you're going to try to produce a "Top 10 Unix Commands" list, at least try to get more than 8 of them correct.

pwd prints the current working directory. It has nothing to do with the change-password command, passwd.

On almost all terminal emulators, ^S is the transmit-off (XOFF) or freeze-scrolling character. Stopping the scrolling of text on your terminal screen won't stop the execution of whatever command you mistyped beforehand, though it may make you think you've crashed the Unix machine. Try ^C instead.

Richard Johnson
via the Net

Larry O'Brien responds: The chmod *command should definitely have made it into the Top 10 list. As for a command to stop programs, it varies from system to system, which is one of the good reasons to hate Unix.*

I just finished reading Larry O'Brien's article in the November/December '95 issue of *InterActivity*. I thought it was a great pointer in the proper direction for neophytes.

One thing that you didn't bring out is how hard it is to convince a sysadmin that you actually need that Webspace. I remember when I first started authoring, it took me a little over two weeks before the sysadmin would even acknowledge our company's capabilities with regard to running a Web site (almost two years ago).

Interestingly, this is the same sysadmin that put the finishing touches on our Do-It-Yourself Web! World Wide Web Self Publishing server just over two months ago. It's a great tool that lets you act as your own Webmaster without all the "real" headaches. You can check it out at http://web.idirect.com if you're interested.

Ross Wm. Rader
General Manager
Internet Direct Canada
via the Net

Motion Capture Unkudos

Simon Knights' Animata column "The Power and Pitfalls of Working with Motion Capture Technology" in *InterActivity*, September/October '95, provides a good overview of character animation but contains some glaring errors in its reference to magnetic motion trackers.

Your readers should know that Ascension's DC magnetic tracker, Flock of Birds, supports up to 60 nodes (receivers), allows realtime capture of all kinds of complex motions, and operates well in even harsh environments. The key to good performance lies in taking a few common-sense precautions prior to starting a motion capture sequence. Although our cables are wired, our customers typically bunch them into a single trailing tether. In this way, sword fighting sequences are possible — as animators such as Mr. Film Studios in Venice, California, have routinely demonstrated — without disastrous results, as your writer opines. Similarly, a "big chunk of metal" in the room will not "muck up motion capture" as the writer states unless it lies between an actor and our transmitter box. One of our customers even operates his tracker on the 17th floor of a skyscraper and routinely captures beautiful motions.

Jack Scully
President
Ascension
Burlington, VT

Simon Knight responds: Having talked with Mr. Scully, we both agree that pre-planning is essential for successful motion capture. It is true that with the correct setup, a sword fighting sequence can be successfully captured on a magnetically based motion capture system. Many users carefully tether the cables into one manageable harness. However, it is also true that these systems pose some inherent limitations on the mobility of the human actor, which was my main point.

Metal objects can present a problem to these magnetically based systems. Again, by carefully planning out the motion capture area, by constructing a sub-floor, and by keeping metal supports away from the receivers, most of these artifacts can be eliminated.

Kudos

Congratulations on a truly fine magazine. I don't normally compliment magazines, but your publication is an exception that demands recognition. *InterActivity* appears to have captured the formula that sets apart the exceptional from the ordinary.

Your coverage of design ideas and product evaluations provides practical insights into the really important issues of interactive multimedia development and deployment. Each issue has been ripe with information and ideas that aspiring and experienced multimedia designers need to compare their own efforts or plans against. As you expand your operations,

I hope you stay true to your principles, coverage, and format.

Here's to your continued success.
David J. Wormsbecker
via the Net

Re: Case Study on Ron Cobb [November/December '95]. Yes! Good to finally hear from intelligent people with real knowledge of the field. Keep that up.

Robin Solis
via CompuServe

Macs Make Life Easier

Connor Freff Cochran's November/December '95 article on storytelling was excellent. But I have to correct him on one thing: the relative difficulty of using CD-ROMs with PCs and with Macs. After telling a typical PC user's tale of woe and lamenting that after three months of trying, almost a quarter (!) of the titles he tested "never worked at all," Cochran goes on to say, "Such headaches are just as common in the Mac world, different only in specific kind and not in general annoyance."

Sorry, but that just isn't so. Consider, for example, Brøderbund's figures on returns of *Myst* due to technical problems (i.e., users who can't get the product to work). Mac version: 1 in 20.

P. O. V.

Windows: 8 in 20. Eight times as many Windows users — nearly one in two — simply can't get the CD-ROM to work. And this was no quick-and-dirty cross-platform port. *Myst* for Windows had a substantial budget, took a year to do, and required more man-hours than the Mac software it's based on.

Or take a look at the recent review of 23 CD-R systems in *New Media* [September '95]. "While we completed our Mac software testing in short order with only rare phone calls to manufacturers, the Windows testing delayed this article by three months and contributed to many sleepless nights. We wasted many weeks and phone calls wrestling with conflicts between different software and firmware revisions. . . . Nearly every day one bug or another brought our PC tests — and our three PC configuration experts — to their collective knees. The Mac remains the hands-down choice for ease of use and compatibility."

I've run more than a hundred CD-ROMs on half a dozen Macs, ranging from a beat-up, nine-year-old Mac II to a bottom-of-the-line, five-year-old PowerBook 100 to a shiny, three-week-old Power Mac 7500. I have never seen a CD-ROM fail to run on a Mac. Come to think of it, I don't know anybody else who has — and I know lots of Mac users. That doesn't mean it can't happen, but it does confirm that it's a pretty rare occurrence in the Mac world.

By his own account, Cochran poured three months of work and an extensive (and expensive) series of hardware upgrades into a valiant effort to get twenty CD-ROM titles to run on his PC. When he still has a 20% failure rate after all this effort and expense, he might be forgiven for consoling himself with the comfortable fiction that it's just as bad on the other side of the fence. Unfortunately, the facts simply don't support him.

Andy Baird
Educational Testing Service
via the Net

Telling Tales

I enjoyed your Art of Storytelling article. One point it missed is that technology is not only inventing new forms and genres, but it is also giving the old forms a new, almost telepathic forum. The campfire, the corner of the bed, the armchair—all are extended in the digital age. Traditional storytelling is reaching people in new ways. As an example, drop by the Realist Wonder Society at http://www.rrnet.com/~nakamura/. It's a site that uses new technology to tell old-fashioned fairy tales.

In a time of dramatic change, it's important to find those things that do not change. People are trying to understand how to live richly in two worlds, how to manage the tension between tradition and change and be true to both. Who better to communicate this journey than the writers and artists?

I believe people are hungry for this. Why not offer a column to reflect these concerns? Something very human, filled with tender emotion, gentle humor, surprising insights, and unbounded imagination.

Chuck Duffie
The Realist Wonder Society
via the Net

F. A. Q.

BY ERICA SMITH

Q: *How do software companies develop the retail price of their products?*

A: There is no cut and dried answer to this one. The basics of pricing revolve around such factors as your costs (factor in labor; materials; equipment expenditures; licensing fees; legal fees; advertising, promotion, and mailing expenses; etc.), your distribution model (how many units do you expect to sell; how much will you have to pay your distributor and retailers; etc.), what the market will bear for the content you're delivering, and so on.

Many base their pricing on patterns set by previously published product. If you're building a CD-ROM that looks and acts enough like another title or follows a particular genre of titles, you can see what your competition is charging and go from there.

You may think your title is worth a bunch of cash — indeed you may *need* your title to sell for big bucks — only to find that other titles in the marketplace actually make it next to impossible for you to charge what you'd like. In fact, Laure Levin of KidSoft points out that similar products from other companies in the children's marketplace can actually bring down the value of an entire genre through market saturation.

Your distributor and resellers can also be very helpful to you in the area of pricing. Eric Winkler at Brøderbund tells us Ingram-Micro keeps him apprised of market trends and is upfront about how they expect new products to sell.

If capturing market share or simply reaching a lot of people is your prime goal, say to establish brand recognition, then you may want to consider bundling your software with another product (soundcards, video boards, computers, and other CD-ROMs are all fair game). But be careful, bundling is a strategy often used to unload shovelware and can have negative as well as positive connotations.

Of course, if you've got a product that can't be compared with anything out on the shelves, you may employ a strategy that's part guestimate and part sky's the limit. Start by figuring out what the customer gets from a product, be it time saved, comprehensive resources or a unique educational/gaming experience in the marketplace. If your title might save the customer hours of reading or demonstration time and provide entirely new applications in which to use the information, it can translate into big savings and a big price tag. Take, for example, *A.D.A.M.*, the medical anatomy software (see our May/June '95 issue). It was marketed to doctors and medical schools for $6,000 per disc (!) when it was first released. It currently retails for $1,695 and is used in every medical school in the U.S.

Q: *Enjoyed the case study on* Myst *in your first issue but was wondering how* Myst *was ported from Mac to Windows.*

A: Because Cyan developed *Myst* in HyperCard, and there still isn't a HyperCard client available on the Windows side, a team from Brøderbund basically recoded the whole thing in C++ from scratch, using an internal development system. Brøderbund, of course, is the distributor for Rand and Robyn Miller's Cyan.

According to Matt O'Hara, the systems product manager who oversaw the port, they started on the MPC version concurrent with the Mac, and it took an extra four or five months to finish the Windows version. During this time, at least five people worked on it, including two programmers, Matt, and the sound crew.

All the assets — the art, the sound, all the information components — already existed in separate files. The graphics files were all received as .PICT files or Quick Time movies from Cyan. Brøderbund's team reprocessed them using Debabelizer into .bmps for Windows and developed a new super palette because Windows needed a slightly smaller set of colors. No major changes were made to the files, but some of them had to be reworked because they were picking up Windows system colors.

Tom Rettig, the sound director for Brøderbund, received all the 16-bit, 44.1kHz sounds, and with another soundperson went through the game and came up with a list of all the places the sounds belonged. They extracted that information from the HyperCard stacks provided by the Millers. Then they had to do some file massaging and a lot of checking and rechecking to make sure they were placed correctly.

One of the biggest challenges for the porting team was redoing the logic again; they were basically recreating the game. That was an arduous task, because with a new code base, a whole new set of bugs crop up. This is a common phenomenon for Brøderbund when handling a title developed out of house.

Q: *What are SoundFonts?*

A: David Battino, editor of *Music & Computers*, answers: The music synthesizers on many current soundcards can play back actual recordings of instruments stored in ROM. But because these are ROM-based sounds, your options are limited if you want to change them. For example, suppose you're working on a song. You dial up the soundcard's flute sound, and it's lush, breathy, and . . . totally wrong for your tune. However, one of the most powerful features of the Creative Labs Sound Blaster AWE32 is its support of E-mu Systems SoundFont technology. The AWE32 can store instrument sounds in RAM as well as ROM, which lets you add new sounds to your soundcard in much the same way you would add a new printer font to your computer. These sound fonts are available from Creative Labs, E-mu Systems, and third-party vendors. Or you can make your own. The AWE32 is bundled with a program called Vienna SF Studio that, among its many other functions, lets you convert .WAV files you record yourself into SoundFonts the AWE32 can then play as instruments. The APIs are identical to Sound Blaster16, the predecessor of the AWE32, so replacing the cards will not raise any compatibility questions. Developers can put SoundFonts on their own CD-ROMs and provide custom audio backgrounds for their projects if they agree to pay the one-time licensing fee. If you have more technical questions about SoundFonts, contact Frank Revel of E-mu Systems at 408.438.1921 x148 or soundfont@emu.com.

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MACUSER EDITORS' CHOICE AWARD 1995 FINALIST

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READER SERVICE NO. 8

R U N   T I M E

Compiled by Erica Smith & Kathleen Maher

Rumor Has It

Twitch 'n' shout. **GT Interactive** just shipped *Hexen: Beyond Heretic*. They're billing it as the "most immersive, realworld, combat action game ever produced," and rightly so. Within the 3D worlds of *Hexen*, the player has multiplayer options with cooperative or deathmatch networked play, accelerated graphics, and several roleplaying possibilities. The designers took advantage of a new level editor and advanced scripting tool to enable multiple actions to be triggered by the player's moves. . . . The *1996 Grolier Multimedia Encyclopedia* is on the shelves, a newer, faster version of their most successful reference title. CompuServe Internet links are embedded within 12,000 articles (out of 33,000 listings) on the disc. . . . Turn on, tune in, drop in this disc: *Haight-Ashbury in the Sixties* produced by **Rockument** just shipped as we go to press. A two-disc CD-ROM with the features of an interactive time capsule, a documentary, and a game, it promises to satisfy the cravings of the most ardent rock documentarian. Original animation, interviews, video clips, and music are included. . . . **VeriFone**, **MasterCard**, and **Visa** teamed up in a market study conducted by **Global Concepts** to evaluate consumer and merchant attitudes regarding Internet commerce. They discovered that 32% of World Wide Web users have already bought products and services over the Internet and plan to do so in the future. Of these users, 62% prefer using credit cards for making purchases over the Web, but digital cash and checking account withdrawals showed up second and third, respectively, as alternative preferences for online payment. Not surprisingly, respondents were most concerned with credit card fraud, lack of privacy, and the invisibility of the electronic merchants. . . . Get cracking. **Velocity**, a publisher of entertainment titles, is looking for new products from developers who can take advantage of their 3D multiplayer network and Internet delay mitigation technologies. Ideally, they would like game titles in the action/adventure and simulation categories for the Internet and standalone markets to distribute in domestic and international markets. For more info, contact Mark Yahiro, Four Embarcadero Center, Ste. 3100, San Francisco, CA 94111; vox 415.776.8000; fax 415.776.8099. . . . A group of investors working with **Sega** and **CSK** (Tokyo) have thrown several million dollars into **Integrated Computing Engines** (ICE) for a block of common stock. The money is ear-

Judgment DAY

With a rallying cry of "DOS is dead, long live Win95!" Microsoft celebrated the release of their Game SDK at Judgment Day, a dramatic way to brag about the variety and number of games available for Windows 95.

It was a bigger-than-life press conference where 35 gaming companies announced more than 75 games and accessories designed specifically to take advantage of the power of the new operating system.

The event was one part trade show, one part party. LucasArts, Activision, and several other companies sponsored a haunted house. The first ever *Doom* tournament, Deathmatch '95, pitted 25 of the top *Doom*sters against each other. The finals were held at midnight. Should you wish to peek at these games, check out Microsoft's Windows 95 Games Launch Web site (http://www.microsoft.com/windows/games).

The Game SDK, released Sept. 29, allows developers to write games and create peripherals optimized for Windows 95. The kit includes Microsoft DirectX APIs, including DirectDraw, DirectSound, DirectPlay, and DirectInput (for details, see Omid Rahmat's story on the

Rebel Assault and *Battle Beast* (below) — are just two of many titles being readied for native Win95 release in time for Xmas95.

Game SDK in our last issue), which promise to deliver better than DOS performance and improved compatibility.

"Microsoft's powerful combination will make it possible for developers to concentrate on the task of developing awesome new games, while freeing us from the many pains associated with developing under MS-DOS," commented Jay Wilbur of id Software.

Some of the games featured were Activision's *MechWarrior 2* and ATI Technologies' *Mortal Kombat III*. The hardware companies were showing off products such as Brooktree Corp.'s BtV MediaStream accelerator chipset, Creative Labs' 3D Blaster, Sound Blaster, and Modem Blaster, AMD's

wavetable chip, VictorMaxx Technologies' CyberMaxx 2.0 head-mounted display, the long-awaited SoftImage for Windows NT running on DEC Alpha workstations with Accelgraphics accelerator cards and on an Intergraph TDZ-400 dual P6 workstation, Permedia's accelerator card featuring 3D Labs' OpenGL chip, and the list goes on and on.

READER SERVICE NO. 7

marked for research and development in high performance graphics, signal processing, and virtual reality systems based on ICE's superstation technology. In exchange, Sega hopes to have access to the technology for integration into future projects. ICE's products include a collection of desktop parallel processing workstations for graphics and signal processing applications. . . . **Matsushita** and **3DO**'s recent agreement grants Matsushita the exclusive rights to 3DO's M2 3D graphics technology. Title developers who want to develop for the M2 will have to deal with Matsushita. . . . Merger update: **SoftKey** was making an aggressive attempt to acquire **The Learning Company**, stepping all over **Brøderbund**'s feet in the process. TLC rejected the offer and planned to hold a general stockholders' meeting to announce the merger as we went to press. . . . **Netscape** has been busy shopping. They recently purchased **Collabra**, which will allow them to create nifty new tools and new uses for Netscape technology. Collabra develops software for electronic group conferencing. Netscape hopes to exploit workgroup computing and Web sites for applications such as inhouse training. . . . **CNN Interactive** is forging a strategic alliance with **AT&T**, providing a forum called the **AT&T Business Network**. As part of the agreement, CNN will provide business content and remove its business forum from CompuServe. The companies will explore program development to link broadcast TV and online services. . . . **CompuServe** is trying to get a leg up on the competition. While they belatedly purchased Mosaic to offer Web access and improved Internet access to their subscribers, CompuServe is also forming a partnership with **Xing Technology** to incorporate audio technology, including voice audio compression and decompression. This should enable them to offer online conferencing tools such as realtime voice transmission and give them the capacity for broadcast quality music. The new technology will be available as part of CompuServe's upgraded WinCIM 2.0 interface, which should be available by the time we go to press. 🐝

Got News? Send it to *InterActivity*, 411 Borel Ave., Ste. 100, San Mateo, CA 94402; fax 415.655.4360; Internet interactivity@mfi.com.

Macro MANIA!

The Macromedia International User Conference held in San Francisco Oct. 30-Nov. 1, 1995, brought a blizzard of news from the makers of the most popular multimedia authoring system. At the top of the pile is Shockwave For Director, a technology that enables full-blown Director movies to be played back via the World Wide Web.

A utility called Afterburner compresses, optimizes, and packages Director-authored presentations for Web delivery. (Compression is reportedly around 60%.) Then a Shockwave-capable browser can download and play them transparently as the user surfs the Web, making dynamic multimedia content appear as an integral part of the online experience. The player for Shockwave For Director is available as a plug-in for Netscape Navigator 2.0. (As we go to press, a public beta version can be downloaded from http://home.netscape.com/comprod/mirror/index.html.) Microsoft Blackbird, Navisoft NaviPress, and Silicon Graphics WebForce are expected to follow, with provisions for streaming and caching in the works.

A Shockwave For Director developer's kit, including Afterburner, documentation, sample movies, and the Navigator plug-in player, is available free of charge to registered owners of Director 4.0 via http://www.macromedia.com.

As if to prove that Shockwave isn't a replacement for Sun's ballyhooed Java programming language — although from a nonprogrammer's POV it certainly appears to be one — Macromedia also announced support for Java applets in Director and Authorware. Macromedia will incorporate applets as a new media data type that can be animated and composited with other media data types.

In his keynote address, Macromedia president Bud Colligan mapped out the company's plan to integrate their production and processing tools with their authoring systems. The goal is to create a consistent user interface, plug-in architecture, and information exchange protocol across all Macromedia apps. Colligan demonstrated the way Director 5.0 will be able to switch seamlessly to SoundEdit 16 for trimming an audio file, then return for continued work on a larger production. The first three plug-ins for Director (Xtras in Macromediaspeak) were announced by Gray Matter Design ($299 each). Sound Xtra enables authors to incorporate enduser sound controls such as record, playback, pause, and stop. For enhanced user interfaces, PopUp Xtra creates hierarchical pop-up menus within a Director movie. PrintOMatic Xtra provides printing functions so that endusers can print order forms, data sheets, test results, and the like.

SoundEdit 16 2.0 for the Mac or Power Mac ($399, $129 upgrade) is the first product to support the Macromedia User Interface, which will eventually make all the company's tools operate according to a consistent set of conventions. The program also supports Xtras and ships with a plug-in loop tuner and multitap "preverb."

The new version includes a host of productivity enhancements as well as improved basic functionality such as stereo mixing and input level controls. Sounds can be imported or captured directly from CD. The new batch processor automates tasks such as converting bit resolution, sample rate, and/or file format across a number of audio files, while dither and brighten options improve the sound of low-res formats. SoundEdit 16 2.0 includes IMA compression for 4:1 data reduction, and the Sun AU file format, popular online, has been added to the 12 formats already supported.

• Macromedia, 600 Townsend St., San Francisco, CA 94103; vox 800.326.2128, 415.252.2000; fax 415.626.0554. **Reader Service #100**

• Netscape, 501 E. Middlefield Rd., Mountain View, CA 94043; vox 415.528.2555; fax 415.528.4124; Internet http://www.netscape.com. **Reader Service #101**

• Gray Matter Design, 300 Brannan St., Ste. 210, San Francisco, CA 94107; vox 415.243.0394; fax 415.243.0396; Internet mediabook@aol.com. **Reader Service #102** 🐝

N E W   G E A R

Compiled by Ted Greenwald

The Web on a Budget

A Japanese startup called Webtronics has drastically lowered the price of entry to publishing on the World Wide Web. The WebBox ($990), a standalone httpd server for Ethernet networks, provides everything you need to establish a presence on the Web except a network router, phone line, and content.

The WebBox's stripped-down approach is intended for low-traffic, low-volume situations, including small business and personal sites. It doesn't require a hard drive, monitor, or keyboard, but includes an LCD display for setting an IP address/netmask, 32-bit processor, Ethernet interface, and 2MB Flash RAM (expandable to 8MB and beyond via a PCMCIA slot). Application software is included for file exchange, messaging, and HTML authoring, and operating system updates can be downloaded directly from Webtronics via the Internet. Furthermore, the WebBox is configurable and expandable. A Tcl interpreter is built in, and all source code (in Tcl) is provided.

• Webtronics c/o Corporate Source, 26071 Merit Cir., Ste. 108, Laguna Hills, CA 92653; vox 800.722.7748, 714.582.1946; fax 714.582.3706; Internet cs@ix.netcom.com.
Reader Service #103

Authoring for the Rest of the Rest of Us

Conceived on the principle that interactive media developers should be liberated from the necessity of programming, Apple Media Tool 2.0 ($495) for the Power Mac is an extensible, crossplatform, object-oriented authoring system. Version 2.0 boasts an improved user interface and a new architecture that separates the runtime engine from the authoring and scripting environments, enabling applications for Windows 95 and Mac to be created in a single process.

AMT 2.0's metaphor is a storyboard or map, with enhanced media support including RTF for unrestricted use of fonts, type sizes, and type styles; custom color palettes; and flipbook animation. Authoring of event-driven structures is accomplished through drag-and-drop techniques. Objects such as media, events, and actions can be manipulated directly without scripting. All key Apple media technologies are fully supported, including QuickTime and QuickTime VR, as well as features such as AppleScript.

For applications that demand scripting, the system can be augmented by Apple Media Tool Programming Environment ($999).

• Apple, 1 Infinite Loop, Cupertino, CA 95014-2084; vox 800.282.2732, Canada 800.637.0029, international 716.871.6555; Internet http://www.info.apple.com.
Reader Service #104

Transportable Storage Media

Producing digital media raises a thorny problem: sharing data among collaborators. Networking is one solution. More cost effective, of course, is using portable storage media. Trading media becomes a simple matter with MicroNet's DataDock for the Mac, a system that accommodates removable modules in a variety of formats that now include DAT, SyQuest, and magneto optical.

Designed for tasks in which large file sizes are routine, DataDock comes in two configurations that accept modules in any combination: a two-module desktop unit ($735 Fast SCSI-2, $880 Fast/Wide SCSI-2), two-module rackmount

P R O C E S S O R   Wars ◄·····

The arrival of Intel's next-generation Pentium Pro processors with speeds up to 200MHz means yet another price/performance breakthrough in desktop computers. Among the first machines to use the new technology are Intergraph's TDZ graphics workstations. The TDZ line includes models that incorporate one, two, and four Pentium Pros in combination with Intergraph's own GLZ1 graphics accelerator. Performance is sufficient for demanding graphics, animation, CAD, and simulation tasks, and is said to exceed that of SGI's Indy and Indigo2, even when equipped with the High Impact option.

TDZ Workstation

The TDZs run on Windows NT, which provides interoperability with networked Unix systems as well as multithreading capability to take full advantage of multiple processors. In addition, NT supports both the OpenGL 3D API and, thanks to the use of Intel processors, the full range of conventional DOS, Windows, and Win95 applications in native mode.

The GLZ1 graphics board integrates multiple custom 3D accelerator chips and up to 34MB of video RAM — ample horsepower for drawing 500,000 triangles per second. Other features include 24-bit double buffering, 8MB to 32MB of texture memory, 10-bit gamma correction, support for dual screens in sizes up to 27 inches, and resolution of up to 2 megapixels.

TDZ systems are multimedia-ready, incorporating motherboard-level networking, Fast SCSI-2 disk controller, quad-speed CD-ROM reader, and audio capabilities with built-in microphone and stereo speakers. Hardware RAID yields high I/O rates, and 512MB of memory are devoted to error-checking and correction for efficient handling of large files. Airflow is optimized to keep the hardware cool without fans.

The TDZ line includes the single-processor desktop TDZ-300 ($12,900-$23,400 depending on options) and dual-processor deskside TDZ-400 ($18,700-$47,700), both of which run at 150MHz. 200MHz versions are expected by the time you read this, and the quad-processor TDZ-600 (prices to be announced) soon thereafter.

• Intergraph, CR1102, Huntsville, AL 35894-0001; vox 800.763.0242, 205.730.2000; fax 205.730.6188; Internet http://www.intergraph.com/ics. **Reader Service #105**

($925 Fast, $1,085 Fast/Wide), and six-module rackmount ($2,299 Fast, $2,415 Fast/Wide). The two-module rackmount system can be expanded one module at a time for $690 per Fast and $860 per Fast/Wide dock.

Module options include 2GB DAT ($1,099), 8GB DAT ($1,545), 270MB SyQuest ($635), and 230MB magneto optical ($770). Hard drive modules of up to 4GB are also available with Fast or Fast/Wide SCSI-2 interfacing ($370-$2,110). They can be configured either as individual drives or as MicroNet Raven or Raven Professional RAID arrays. In RAID configurations, modules are physically attached and transported as a single unit.

Modules spin up and mount automatically when inserted into a dock and spin down automatically when the associated icon is dragged into the Mac's trash can. To prevent accidental data loss, modules can't be disengaged while active. All modules feature a reusable labeling surface for easy identification.

• MicroNet, 80 Technology, Irvine, CA 92718; vox 714.453.6000; fax 714.453.6001.
Reader Service #106

Networked Voice, Video, & Data

According to California networking specialists Luxcom, producing and delivering multimedia is hard enough without the additional complexities of networking. Their solution is isoMAX ($17,000), a ready-to-run "multimedia dialtone" server and network hub for running networked applications such as desktop videoconferencing, multimedia email, distance learning, and Internet access.

IsoMAX uses the isochronous Ethernet protocol, or isoEthernet, which marries Ethernet with ISDN in a single connection. This makes it possible to deliver both standard voice communication and integrated multimedia to the desktop via conventional twisted-pair wiring (unshielded or shielded) at distances of up to 100 meters. IsoEthernet is fully compatible with existing LAN and WAN infrastructures and with emerging protocols such as ATM. In addition, it's transparent with respect to current Ethernet applications.

The compact switching hub includes 12 ports, 11 for users and one for the server, with autosensing for nodes with Ethernet or isoEthernet adapters. The server, a 486/66 PC, connects to the hub via isoEthernet and to the WAN via ISDN PRI or PBX without the need for a further gateway system. The WAN interface, complete with modem, is compatible with public carrier services and both narrowband and wideband ISDN.

To make the system as turnkey as possible, Luxcom plans to certify applications for isoMAX. They are also active in efforts to standardize isoEthernet drivers.

• Luxcom, 3249 Laurelview Ct., Fremont, CA 94538; vox 800.322.5000, 510.770.3300; fax 510.770.3399.
Reader Service #107

Realtime MPEG Encoding

It's MPEG fever out there as products that support the full screen, full motion video compression spec flood the market and price/performance ratios tumble. Realtime encoding is one of the hottest fronts into which SAI has introduced the dramatically priced Enigma MPEG 1 board for the PC ($4,500).

Enigma handles data rates as low as 8kB per second (for Internet delivery) and up to 4MB per second (8x CD-ROM). The unit supports PAL, NTSC, and S-VHS and performs realtime transcoding between formats. The audio output is 16 bit, 44.1kHz. Audio and video are processed on the same board and synced to the same clock for optimal precision.

Enigma automatically predicts changes in motion and alters encoding parameters to match the specific content of the footage being processed. The process can be adjusted manually as well via user-definable parameters such as I, P, and B frame combinations. According to the manufacturer, the efficiency of the motion-estimation algorithm, with a search range of up to 16 pixels in any direction, combined with half-
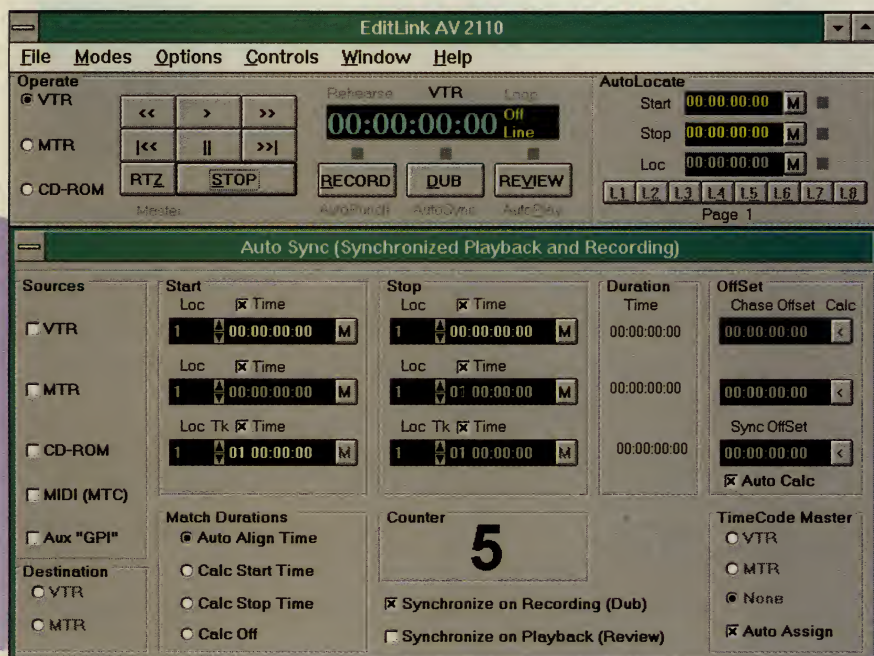
Control FREAKS ONLY

Making it possible for one operator to control all the devices in an audio/video studio from a single interface, FutureVideo offers EditLink AV 2110 For Windows ($695). The system consists of an 8-bit ISA bus controller card and a software control surface.

EditLink AV 2110 provides timecode synchronization between two banks of audio devices (up to four devices per bank depending on device type) via RS-422A, MIDI Machine Control, or Control-M and Control-L (for prosumer VTRs). Compatible machines include VTRs (S-VHS, Hi8, MII, and Betacam), ATRs (ADAT, DTRS, and DAT), and CD players (audio and ROM). The system also generates MIDI timecode (MTC) for locking MIDI sequencers and digital audio workstations.

Control functions include playback, loop playback, autolocation (800 points), adjustable preroll/postroll, automatic offset calculation, record-enable and -activate, and punch-in and -out.

• FutureVideo, 28 Argonaut, Aliso Viejo, CA 92656; vox 714.770.4416; fax 714.770.4667; Internet 75162.666@compuserve.com. **Reader Service #108**

To BE or Not to BE ◄ ·················

After a decade of updates, extensions, add-ons, and hacks, the current generation of computer architectures has become top-heavy. Systems are complex and fragile. New technology is difficult to integrate. Software development is slow and arduous. All of which is especially troublesome when it comes to demanding applications such as developing interactive multimedia.

Taking a bold step toward the future of desktop computers, Jean-Louis Gassee, former president of Apple's product division, founded Be Inc. to build cost-effective computers based on next-generation designs. The first fruit of his labor has arrived: The BeBox ($1,600). Outfitted with high quality graphics, audio, video, and communications capabilities, the Be-Box incorporates dual PowerPC 603s running at 66MHz plus a fixed-point unit, floating-point unit, load/store unit, memory management unit, 8kB data and instruction caches, and up to 256MB RAM. It runs a portable, object-oriented operating system that supports true preemptive multitasking, integrated database, fast I/O, and a range of expansion options. Interfacing includes PCI, ISA, IDE, and SCSI buses plus multiple ports for MIDI, serial, parallel, joystick, infrared, and "geekport" devices.

Be hopes the combination of multiprocessor horsepower, operating system innovation, familiarity of development tools — coupled with the opportunity to catch a breaking wave — will make the system attractive to developers.

• Be, 800 El Camino Real, Ste. 300, Menlo Park, CA 94025; vox 415.462.4141; fax 415.462.4129; Internet info@be.com, ftp.be.com, http://www.be.com. **Reader Service #109**

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pixel resolution results in extraordinarily high quality even with difficult material such as fast-moving action and zooms. Since processing is frame-accurate, sequences to be processed can be defined precisely. The system also provides a realtime preview mode that splits the screen between incoming and outgoing video for direct comparison, so one video monitor is sufficient.

Plans to provide hooks for editing programs such as Adobe Premiere and In:Sync Razor are in the works, as is a daughterboard providing digital I/O.

• SAI, 14 Rockware Ave., Greenford, Middlesex, UB6 OAA England; vox 44.181.578.5668; fax 44.181.578.1603.
Reader Service #110

Video on Fire

Hot on the heels of their Flame 4.0 and Flint 4.0 video processing programs (debuted at Siggraph '95), Discreet Logic introduces Fire, a full-resolution video and audio editor that runs on the Silicon Graphics Indigo and Onyx. Fire provides timeline and storyboard editing of uncompressed images plus a variety of controls over

transitions in real time. Color correction, chroma keying, and character generation are included, as well as 64 tracks of audio with realtime EQ and crossfading.

In partnership with audio powerhouse Sonic Solutions, Discreet Logic offers Stream, River, and Rain, three subsystems devoted to creating and enhancing audio. Stream provides 4 I/O channels and 12 tracks of hard disk recording. River increases those numbers to 8 I/O channels (expandable to 64) and 16 tracks (expandable to 100). Editing and processing capabilities are supplied by Rain.

Discreet Logic is also busy with a bid for market leadership in virtual set technology. Their latest moves have been to acquire the Hybrid Vision System from France's Institut National de l'Audiovisuel, which matches movement between virtual and real camera systems, and the Vapour 3D modeling, animation, and rendering program from COSS of Austria. To enhance their presence in the broadcast market, they've acquired Brughetti, which offers complementary products for that market.

• Discreet Logic, 5505 boul St-Laurent, Mon-

treal, Quebec, Canada H2T 1S6; vox 514.272.0525; fax 514.272.0585.
Reader Service #111

Drag-and-Drop 3D

Arena Design is a 3D modeling, animation, and rendering package from Andover in versions for Windows 3.1 and Win95. It features integration of modeling, scene creation, and animation within a single drag-and-drop environment. With the ability to generate 3D models from TrueType fonts, you can generate moving 3D logos easily. By attaching sounds to events within an animation, you can create dynamic multimedia scenarios.

Three versions are available: entry-level Arena Design ED ($59); the more advanced Arena Design ST ($199) with ray tracing and adaptive anti-aliasing, video texture mapping, and improved control of lighting and camera motion; and Arena Design Pro ($599) for professional applications. The Pro version adds higher resolution, solid texturing, network-distributed rendering, alpha channel support, and multiple degrees of anti-aliasing.

• Andover, 532 Great Rd., Acton, MA 01720; vox 508.635.5300; fax 508.635.5326.

Reader Service #112

CBT Preauthoring System

Designer's Edge from Allen Communication, the world's first "preauthoring" system, accelerates and manages the process of designing computer-based training applications. Distilling the company's cumulative experience developing CBT for such clients as AT&T and IBM, the Win95 program is intended both as a productivity tool for experienced developers and as a facilitator for novices.

Designer's Edge leads authors through the design process step by step covering analysis, design, development, implementation, and evaluation in 12 distinct phases. Rather than enforcing rigid rules and structures, the program prompts authors for input, suggests alternatives, and organizes tasks. Four kinds of context-sensitive advice are provided: traditional help, prescriptive advice, a "show me how" course, and design wizards. The system also creates helpful forms and reports.

• Allen Communication, 5 Triad Center, 5th Fl., Salt Lake City, UT 84180; vox 800.325.7850, 801.537.7800; fax 801.537.7805; Internet http://www.allencomm.com/.

Reader Service #113

QuickTime Batch Compression

Staring at scads of video files that need to be compressed into QuickTime movies? The most developer-friendly solution may be Movie Cleaner Pro 1.1 for the Mac from Terran Interactive. This slick utility lets you select up to 2,000 files for batch processing with any QuickTime-compatible codec simply by selecting them and dropping them on the program's icon. You can enter a single set of processing parameters for all films or specify settings for individual movies while globally processing the rest. If you need your computer in the meantime, batch processing can be suspended and resumed at any time, enabling you to make optimal use of time.

Compression and processing settings, selectable in a single window, include codec type, frames per second, pixel resolution, blur, and audio resolution, as well as cropping and audio and video fade-in and -out. A "talking heads" filter allows you to specify an area in the frame that doesn't change (say, the background behind an announcer); the codec refrains from updating this area, which improves performance elsewhere in the frame. There's also an option to maintain high quality in the first and last frames of a clip. This keeps a good-looking image on the screen before and after the clip is viewed.

The Movie Expert wizard makes it easy to select appropriate compression settings. Selecting plain-English priorities such as SMOOTH MOTION vs. CLEAR IMAGE QUALITY or VIDEO QUALITY vs. AUDIO QUALITY automatically selects parameter values. You can evaluate the effect of compression by dividing the frame between compressed and uncompressed images. Useful parameter settings can be saved for later use. (A shareware version, Movie Cleaner Lite 1.1, is also available. It lacks batch processing and is not accelerated for the Power Mac.)

• Terran Interactive, 21471 Lee Dr., Ste. B, Los Gatos, CA 95030; vox 800.577.3443, 408.353.8859; fax 408.353.3871; Internet info@terran-int.com, http://terran-int.com.

Reader Service #114

VIRTUS® WALKTHROUGH PRO™ 2.5, THE 3-D PUBLISHER FOR THE INTERNET.

With Virtus WalkThrough Pro 2.5, featuring VRML export and stereo-viewing support, anyone can export 3-D environments to the World Wide Web. As Mark Pesce said, "Virtus' acclaimed interface, rich functionality, and cross platform capabilities will make it a powerful world creation tool for the Web."

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READER SERVICE NO. 12

LIVE SHOW

EBN INFO

LIVE ACTION

LIVE ACTION

Emergency Broadcast Network

MAKING AN ENHANCED CD THAT DESERVES THE NAME

To those who wonder whether the new crop of Enhanced CDs are worth the plastic they're pressed on, we have three letters for you: EBN. Emergency Broadcast Network, a six-member collective from Providence, Rhode Island, are the brains behind *Telecommunication Breakdown* (TVT Records), one of the most compelling of these new-breed platters to woof our tweeters and tickle our pixels. While many CD Plus presentations are snoozefests — little more than Red Book audio meets interactive press kit — EBN's disc snarls with po-mo attitude as it combines, distorts, and recontextualizes the media-saturated environment that serves as the group's playground. Video is as integral as audio to EBN's art, and the CD Plus format gives them an opportunity to present the two in context. Their in-your-face assemblage of found images

BY GREG RULE

EBN
emergency broadcast network

and sounds leaps off the laser with coherence and focus that most multimedia producers only dream of.

Telecommunication Breakdown combines four presentations: a Red Book audio album, Yellow Book QuickTime videos, an interactive "video wall," and a slimmed-down floppy version of the latter for fans who don't own a CD-ROM player. While all of the music can be heard using a standard CD player, three selections appear in QuickTime versions as well, one being a hiphop-inspired paean to television entitled "Electronic Behavior Control System." To run it is to love it.

Launch the flick and you'll be greeted by Josh Pearson, your onscreen host. He's strange. Very strange, in fact, with creepy bulging eyes and a menacing grin. The sampled audio track gurgles as a series of personalities familiar and unfamiliar babble testimonials, presumably touting EBN's project. All the while Josh grins fiendishly and jitters inside a small box in the lower right corner of the screen as his image breaks up into TV static. As the music reaches a rolling boil, Bill Clinton, Al Gore, Ross Perot, and Ted Koppel mouth the words of the title with apocalyptic verve.

That's just the noninteractive part. After blasting the audio and savoring the video, it's time for the machine-gun experience of EBN's interactive video wall. As the presentation loads, a test tone blares and the seconds count down against a flashing test pattern on the screen. Then the wall appears: 16 separate video fields that run simultaneously accompanied by looped audio fragments from the album. As rapid-fire found-object images cycle at varying rates, you can click on text fields marked TELECOMMUNICATION BREAKDOWN, EBN INFO, LIVE SHOW, and TECHNOLOGY. The first transforms the wall into a simmering interactive lyric sheet for selections on the album. (Lyrics isn't quite right; most of the words are spoken fragments sampled from television.) The other text fields yield additional information, new audio loops, and altered visuals, though never in a predictable way. In fact, it's rarely obvious just what clicking in a given place at a given moment will do. Meanwhile the 16 videos continue to mutate and cycle with every click.

For more standardized navigation, a simple panel appears in the lower left corner. Along with PREVIOUS [screen], MAIN [menu], QUIT, and HELP buttons, the panel offers two labeled EFFECTS A and EFFECTS B. When you press one of these, the entire wall freaks out in a double-time barrage of color and imagery.

More than multimedia artists, EBN are technovisionaries who have invented a new form of sampling embodied in a product called the VideoSampler. "It's a simple concept," Josh Pearson explained recently as we probed the reason and rhyme behind the group's creative vision. "It applies the principles of audio sampling to video. That means instantaneous playback and manipulation of video using any MIDI controller, whether it's a MIDI keyboard, percussion pad, guitar, or any device that can send a MIDI note message."

To bring their concept to life, EBN founders Pearson and Gardner Post enlisted the expert assistance of computer brains Greg DeoCampo, founder of CoSA (original developer of Adobe AfterEffects), and Mark Maranello. "The prototype version of the VideoSampler has a very basic interface that lets you create forward loops, reverse loops, and alternating loops," Pearson explains. "You have a start loop point, an end loop point, and a middle loop point. You can assign various functions to the pitch-bender of your MIDI keyboard so you can jerk the clip around to your heart's content. It's like scratching with video," he concludes, referring to the DJ technique of pushing and pulling vinyl records beneath a turntable's stylus to create rhythms.

It makes sense that EBN would marry the two technolgies. "At first," Pearson recalls, "we created multimedia installations involving painting, sculpture, and video in an effort to create all-encompassing environments that would provide maximum sensory stimulation for the viewer. Our first project was 'Model Apartment,' the place where we lived. By 1987 we were doing multimedia installations in gallery-type venues."

Post adds, "We also had the whole Telepodium project" — one screen of the video wall's TECHNOLOGY section is devoted to this invention, which was developed, according to *Telecommunication Breakdown*'s electronic liner notes, "to evaluate the use of television entertainment as a weapon" — "which started as a replica of the presidential podium. We were making videos out of found footage of politicians set to music. For the opening night we would do a little performance through a P.A. and crank it up. That's how we started."

From such humble beginnings, Post, Pearson, and DeoCampo have created a monster — or, as they might have it, the monster that is contemporary electronic communications has created them. We were pleased to find them happy to share the ideas and techniques behind *Telecommunication Breakdown* and other EBN projects. As first-wave representatives of the coming generation of multimedia garage bands, EBN has much to say about shoestring production and not a little about combining audio and video effectively in the emerging CD Plus format.

* * * *

Walk us through the methods you use to create a multimedia presentation, using "Electronic Behavior Control System" from Telecommunication Breakdown *as an example.*

Post: Josh came to me with these weird words that he had cataloged: "I found someone saying 'electronic,' I found someone saying 'behavior,'" and so on. We'd cataloged and transcribed the presidential debates, and we realized we had people saying all these scary words, so we put them together. For them all to chant "electronic behavior control system" was truly terrifying. We have 600, 700 hours of cataloged video and hundreds more that are yet to be cataloged to draw upon. It's sort of a game of free association. Other times we'll start with a concept and then find clips to support that idea.

How do you do your audio sampling?

Pearson: In the old days we would sample audio from the videotape using a Roland S-770 and W-30, and simultaneously we were sampling beats, bass lines. So while the video is being recorded and cataloged in handwritten notebooks, we're coming up with music — looking for beats, amassing a huge library of killer break beats and various sampled sounds. Sometimes the music will just naturally go with certain clips, sometimes certain clips require a certain kind of music. Then we sequence it with whatever musical composition we happen to be working on at the time.

What MIDI sequencer do you use?

Pearson: At the time it was the sequencer in the Roland W-30, which has seen a lot of service. It's done great over the

years. Keep in mind that for all the songs on the CD, the basic demo versions of those songs were created about two or three years ago. We were working with the W-30 sequencer, the S-770, and 3/4" video editing. We'd make a finished, polished so-called soundtrack song, lay it onto 3/4" videotape, and then the video editing would begin. That's when we'd go back, find the source video tape, dub it from 1/2" to 3/4" and then painstakingly, and without the benefit of timecode, edit the original clips back onto the sound — carefully synchronizing people's lips and whatnot. We got real good at lip reading. Very painstaking stuff, but it built character.

Taking a step back, how do you capture your clips? Is the TV always on?

Pearson: Oh yeah. We love watching television — we love it! Cable comes into the studio, and the TV is always on. And if something is there, and it's appropriate, we grab it.

And the remote is always nearby?

Post: If I had a dime for every clip I've missed where I've leapt across the room to get the remote, I'd be a wealthy man.

Pearson: It's become more of a job. We don't watch TV for pleasure any more.

Do you use highend video equipment?

Pearson: No, no. We've stuck to standard VHS, although when hi-fi came out our sound quality improved dramatically.

Post: But we started with a couple of VCRs, just taping. We went for the rainbow effect, you know, that sort of stuff. That's how it all began. Then we got turned on to public access cable TV where they had 3/4" editing systems, and we could actually start to edit more precisely. We would write for grants and residencies and get editing time on other people's systems. We'd create a whole body of work in a couple of weeks when we'd stay in some place and use their gear. Then, finally, we got our own used 3/4" offline editing system.

How did you proceed once you had completed the soundtrack?

Pearson: Well, the soundtrack wasn't finished! That's where Opcode and Digidesign come in. In the intervening two years since that original recording was laid down, we entered the digital age. We hooked up with Greg, Macintoshes made an appearance in our studio for the first time, and we got Digidesign's Sound Tools and Sound Designer II, a Digidesign Audio Media card, and Opcode's Studio Vision MIDI sequencing and audio editing software. Once again, our insatiable desire to rework things came into play. We couldn't resist continuing to work on the "finished tracks." They were further edited, chopped up, remixed, and rearranged in Sound Tools. Then we got some remix work done by Bill Laswell and Brian Eno.

There's an interesting story about working with Brian. He did a bunch of passes while he was remixing stuff, and he was just about to do final edits in Sound Tools when he called and told us his computer had died. The hard disk bit the dust, and he couldn't do the final edits. He knew we were under a so-called deadline, so he had no problem with us re-editing his remixes. So we took the DATs of the various passes, chopped 'em up, rearranged 'em, and continued to work on them that way. Finally we had finished music. Using Master-List, Digidesign's CD mastering program, we arranged the order of the CD to our liking, interjecting the standard between-song, channel-changing stuff, and finally the audio was ready to go to mastering. Then we began editing all the video to match the audio.

You had cataloged all the video, so you knew, for example, that you had to go to tape 105 and grab a clip of President Clinton at 03:45.

Pearson: Right. Unfortunately, once again we'd lose audio quality because we had to take our nice polished DAT master and dump it to nasty ol' 3/4".

How did you deal with synchronization?

Pearson: The system we bought is actually an A/B-roll system with timecode, but the timecode part of it didn't work very well. But we would lay it to black tape and then the

The EBN interactive video wall. Each of the 16 blocks is live — click on one to trigger a video spasm or summon EBN background info.

painstaking dubbing process began. We recorded everything on 1/2" VHS for ease of recording and economic reasons, so we had to dub everything from 1/2" to 3/4" and then begin editing. We also began using a Panasonic WJAV-E5 video mixer for simple dissolves and flash frame cuts. So we were doing true A/B-roll editing for all these newer videos. You just hunker down and edit from morning to night.

Sounds like the stuff Excedrin headaches are made of.

Post: Oh yeah.

Pearson: But there are some shortcuts. The editing system lets you save punch-in points on the source tape. So if you've got Clinton saying "behavior," for example, and it repeats every chorus, you don't have to keep finding that spot again and again and again.

At the end of this process you had a linear audio/video track with individual scenes spliced back-to-back, but you hadn't incorporated the pop-up video insets, multi-image blends, and other effects.

Pearson: "Electronic Behavior Control System" was completely re-edited from the ground up digitally. I went back to the source footage on VHS, found the clips, digitized them, and then edited them completely digitally using Adobe Premiere, a RasterOps MoviePack II video card, and CoSA [now Adobe] AfterEffects, Greg's baby, for the special effects. We did a basic edit in Premiere, which is almost the same as the 3/4" edit where it's just straight cuts but faster, since you can cut, copy, and paste the video. Still, though, you have to go through the soundtrack and find the word "behavior" and "control," for instance — you still have to find the beginnings of words and match up their lips. Then, once we had the basic edit done in Premiere, Greg helped us do the special effects using AfterEffects, and that's where you see the inset boxes and all that stuff.

Post: As far as video postproduction is concerned, the inset boxes and all that are not unlike doing an A/B-roll or an A/B/C-roll or an A/B/C/D-roll, where you're running several

EBN
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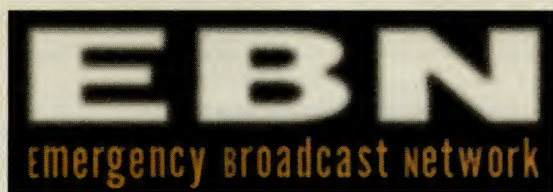
synchronized sources together. So when you see those inset boxes or the images within the boxes, and when they zoom up to full screen, they're all in time with the song. It's all pretty standard video postproduction techniques.

What computer were you using?

Pearson: We used a Quadra 950 with a 1GB hard drive. We weren't able to get full-screen 640x480 images to play back smoothly enough with 44.1kHz sound on that system, so we actually ended up digitizing all the footage at 320x240, which is basically quarter-screen, and editing everything at that resolution with the high-quality audio.

Post: We didn't want to sacrifice any audio quality, but we weren't willing to sacrifice video quality either.

Pearson: Or smoothness. We didn't want things to be jerky. But the thing about that is when you're using Premiere, you

PROGRAM INFORMATION

Using Lingo Xscripts, programmer Greg DeoCampo turned an unsuspecting video window into 16 split personalities. "It happens to be broken up into 16 video channels," he says, "but it could have been any number. We're doing an intelligent mix of playing out the video as individually controllable graphics and video QuickTime files."

can zoom the image to fill the screen and it plays back smoothly with image quality similar to VHS. We were very comfortable with that, since we have this standard of VHS quality [*laughs*]. Things are fuzzy, but that's okay.

Post: Like a bad dub.

Greg, you used Macromedia Director to author the video wall, correct?

DeoCampo: When people ask what it was authored in, I say Director because that was the authoring program. But really it's a Lingo program. The Lingo scripting is particularly sophisticated. It's a body of Xscripts that we call IMP components, for Interactive Media Player. It's part of a larger realtime interactive audio/visual presentation system that we developed.

How did you create the effect of 16 separate videos simultaneously?

DeoCampo: It happens to be broken up into 16 video channels, but it could have been any number. We're doing an intelligent mix of playing out the video as individually controllable graphics and video QuickTime files. The scripts manage what media goes where, and what interactivity is

happening. On startup, you'll notice the 37-unit countdown. What's happening there is that it's processing all of the possible interactivity through all 37 16-channel video walls, so navigating through the experience afterwards is seamless.

Certain actions produce predictable results — clicking on the text headings, for example — but other clicks seem to trigger random results. Did you, in fact, design randomness into it?

DeoCampo: It's actually not random behavior. Every screen has been divided into 16 different elements, a 4x4 array. A click on every other square puts up either a zoomed image of one of the graphics from the wall you're viewing or brings up a text transcription. It's every other square.

What happens when you click on EFFECT A and EFFECT B?

DeoCampo: The idea behind the realtime effects is a notion of digital static. There's a certain class of graphics operations — basically "ands," "ors," or "X ors." When you hit EFFECT A, the red bar along the bottom of the screen is removed. That's one less layer of graphics the computer needs to refresh, so the underlying graphics move faster. That's how you get the video wall to be so blindingly fast. EFFECT B toggles the compositing of the graphics. When we put up a new image, we're doing either an "X or" or an "and" on the addition, which produces the static-like effect. Even though it's the same process throughout all the walls, the effect looks very different in each because it depends on the image that's being used. Different sequences of images do different things.

The floppy disk version of the wall is around one meg smaller than the one on the CD. What makes the difference?

DeoCampo: The floppy disk was originally intended to be an interactive press kit. When TVT Records asked us to do a version for the Enhanced CD, we just added stuff like better interface graphics and way more content. The CD has the text transcriptions plus a lot more notes. It also has a CD controller menu that controls CD audio playback. It does another important thing: If you're using the standard Apple audio CD control panel to play the disc, the interactive portion automatically plays out each track. So as it plays, it automatically generates the visual accompaniment.

Is it true that Telecommunication Breakdown *wasn't originally intended to be a mixed-mode CD?*

Pearson: The album was originally going to be an audio CD that we viewed as the soundtrack to a VHS video tape. But the idea of trying to package a CD with a videotape — you know, it's this clunky package. When the whole enhanced CD thing suddenly became more doable, the label became more enthusiastic.

Post: Greg's company produced an interactive [floppy-based] press kit, and they were so blown away, they were like, "We've gotta put this on the album. There's room for it. Room to expand it. Room to add a couple of videos." We were never very comfortable with the idea of putting out an audio product only, but TVT is in the business of putting out audio CDs, so that was just the way they thought about it. We kept saying, "I don't know if we should do this." Finally they realized that the difference between putting out an audio album and putting out an Enhanced CD was the difference between defining us as just another band or as being on the cutting edge of something or another.

The package is unique in that it includes both a CD and a floppy disk.

Pearson: The interface on the Enhanced CD is exactly the same as on the floppy. We just included a floppy for those users who don't have a CD-ROM drive. If they don't have a CD-ROM drive, they can use their floppy drive to play the floppy, and

if they don't have a computer, they can use their audio CD player to play the CD. And if they don't have an audio CD player, they can use their eyes to scan the packaging and read the motivational messages contained on the inside leaf.

Was there ever talk of doing a full-blown CD-ROM?

Post: We originally conceived a full EBN CD-ROM, but our label, and the record industry in general, is a little wary and skeptical, hesitant to get their feet wet. We're hoping our next product will be a CD-ROM where we can take the whole disc and do an interactive piece where you have a lot of control.

Will the group tour to support the album?

Post: Absolutely. Nothing is scheduled right now, but we're looking.

Pearson: We've been waiting for the product to come out.

Can you describe the show?

Post: Our stage show is designed to make the audience feel

as though they're part of a live television studio audience, and Josh is the host of this EBN program. Recently the rest of us have been setting up facing the stage, right along the front edge, and acting more like a news crew producing the show.

Pearson: The show features the Telepodium, which you can read about in the EBN technology section of the interactive floppy. It's this giant robotic podium device that we've used for many, many years. It has gone through many versions, from prototype to version 2.7. Gardner is the main designer and constructor of the props. The podium grew out of the idea of television as a weapon. It's built to look both like a presidential podium and a missile launcher.

Post: It used to be sort of a glorified microphone stand, but now it's turning into a virtual host. It's an exciting new development. One of the ideas we're exploring as part of our live show is to take the Townshend/Hendrix guitar smashing idea to another level, mounting a computer keyboard to a baseball bat equipped with a MIDI trigger and smashing up our gear while, at the same time, triggering MIDI samples.

Pearson: And the smashing will trigger video clips of other people smashing things. You can smash with the greats! Another thing about the live show is that we're now using VideoSamplers as live playback instruments. Not only is the VideoSampler a great studio production tool for both musicians and video editors, but it's also the first realtime video performance tool. Gardner has taken on the role as chief keyboard player.

Post: It allows me to feel like a rock star [*laughs*].

Pearson: Until a few months ago, we used VHS hi-fi tapes to play back the main videos, but now we're actually using a second computer with a 9GB hard drive playing back big, beau-hunkin' movies with CD-quality stereo sound.

Post: It has made a big difference in our shows. We used to have real low-quality audio and multigenerational video and audio. Now we can step up and perform and sound like most bands.

You don't want to get too good though.

Pearson: Oh, don't worry. With us there's always plenty of room for improvement and failure. Computers crash a lot.

Tell us about the VideoSampler.

Pearson: Basically, we're digitizing footage and loading it with the associated audio into RAM, and that gives us instantaneous playback.

Post: There's always a slight delay when you do it off the hard drive.

Pearson: Once the footage is in RAM, using a MIDI interface — we've been using the Opcode Studio 3 — you can play the video clips.

What's the MIDI software link to the VideoSampler?

Pearson: The prototype version we're using now is created with Opcode's Max.

How does it handle audio?

Pearson: Because this version of VideoSampler is a prototype, we've been using the native audio in the Mac: 22kHz, 8-bit. You don't need an audio card for that. The quality is lower and grainier, but we don't really care.

Is audio editable separately in the VideoSampler?

Pearson: Well, you make your source movie in Adobe Premiere. Then you can make what we call "patches," just like you would make a patch of audio samples.

Post: Video patches.

Pearson: So in Premiere you edit together your patch however you want, and you can alter the audio, add effects, crossfade, or whatever. Once you have that, you load it into RAM

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emergency broadcast network

and the VideoSampler takes it from there.

And as you "play" the video clips, you record your performance.

Post: Yeah, absolutely. Hook up a VCR and just record your jam.

Pearson: Or without even doing that, you can use any kind of sequencer to record the MIDI sequence. So, for instance, we're using the Roland W-30's sequencer with the pitch-bender, and we can create music sequences that simultaneously edit

EBN PERSONNEL
Controller

"We started off doing this stuff as a form of artwork," says Josh Pearson. "The theme was collecting, cataloging, and analyzing all of this video footage to determine what kind of effects, if any, this entirely new and frighteningly powerful medium of television is having on our culture."

our video for us. Finally we have achieved true simultaneity!

Post: Now we can wander in and out of this space between music and video that no one has really been able to explore.

Pearson: The incredible speed and freedom and playfulness you can engage in when using a MIDI keyboard is indescribable. You can also use the computer keyboard to control the video clips, but it doesn't feel quite as well as the MIDI keyboard. It allows you to do things with video that you'd never dream of doing using conventional editing techniques.

Post: People have never really seen video manipulated in this way before. It really takes you aback when you first see it.

Pearson: The capability to create loops is a wonderful thing because even using Adobe Premiere, even doing it digitally, you have to cut and paste and sit there and wait for it to render. Whereas when you're doing it with the VideoSampler, it's all happening instantaneously in real time. We're more willing to experiment now, more willing to play with clips that previously we wouldn't have given the time of day to.

Post: And the bizarre ideas that pop out randomly and accidentally really spark your imagination. For us it's the same excitement as when we got our first audio sampler, but in a whole new way. The audio sampler was amazing, but the video sampler is going to change the face of television and music. Once MTV gets their hands on it, there's no telling what will happen.

Where did the impetus to actually build the VideoSampler come from?

Post: When Greg joined, he kept assuring us that technology would progress year to year, and sure enough it did. He was saying that creating a video sampler using digital video technology was possible. And he did just that. Now we're using it onstage as an instrument, and it'll be the basis of how we produce future material.

We used to simulate it. Now we're actually doing it. We're very excited about no longer being a bunch of fakers. I mean, our main reason for forging this relationship with Greg was to realize one of our early visions of what EBN was supposed to be all about. When we first formed the group, we wanted to make this absolute connection between music and video — to create music out of found video clips.

As far as you know, are you the first to do this?

Pearson: It was definitely a concept we had many, many years ago.

Post: It was easy to think of, but hard to actualize.

What is Mark Marinello's role?

Pearson: He's the main engineer at Greg's latest company, AVX, which he started to help us create the VideoSampler. Mark was one of the first people he hired. He's been the main engineer of the VideoSampler.

Post: Mark is a super-talented guy. He hacked this together using Max software, and he's now in the process of rewriting it in C. AVX is looking at taking the VideoSampler to a product phase and using EBN as a marketing vehicle.

How will the VideoSampler be marketed?

Pearson: We're considering a number of options, one of which is including it as a part of a future CD-ROM where you'll be able to use it not only to jam with a pre-stocked EBN footage library, but also with your own clips.

Post: Sequence your own material. Remix ours. Screw it all up.

Aren't you worried about lawsuits?

Pearson: No. We started doing this stuff as a form of artwork, the theme of the artwork was collecting, cataloging, and analyzing all this video footage to basically determine what kind of effects, if any, this entirely new and frighteningly powerful medium of television is having on our culture. It's a very important topic for discussion — a very important artistic theme. Our work is all-inclusive. We've used so many clips from so many sources that it's obvious we're not trying to bootleg the CBS Evening News and repackage it. We're not using one person or image to sell our product. It's completely fragmentary.

Post: It's a social pastiche.

Pearson: A social commentary pastiche parody. We're also engaged in basic high-level parody and pastiche of the entire corporate network system. Our name is Emergency Broadcast Network, and we see ourselves as a network. Our job is to reprocess all the other networks' programming to create completely new and original compositions. We're basically a big media filter.

Post: It would be a shame if someone tried to put a stop to what we're doing because we're not doing anything wrong. We're just trying to make a social statement. It's about art for us, and that comes first.

So, to date, no one has threatened to shut you down.

Post: No. And now, with things in such a nonlinear form, if someone were to have a problem, they could easily and quickly be replaced. We hope that people will find it an honor, not a personal assault, to be included in one of our pieces. 🕸

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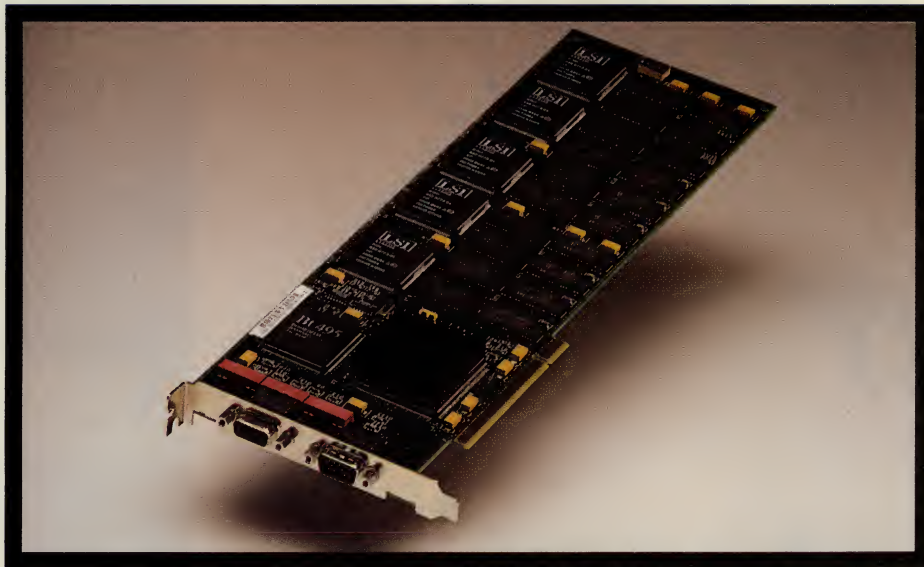
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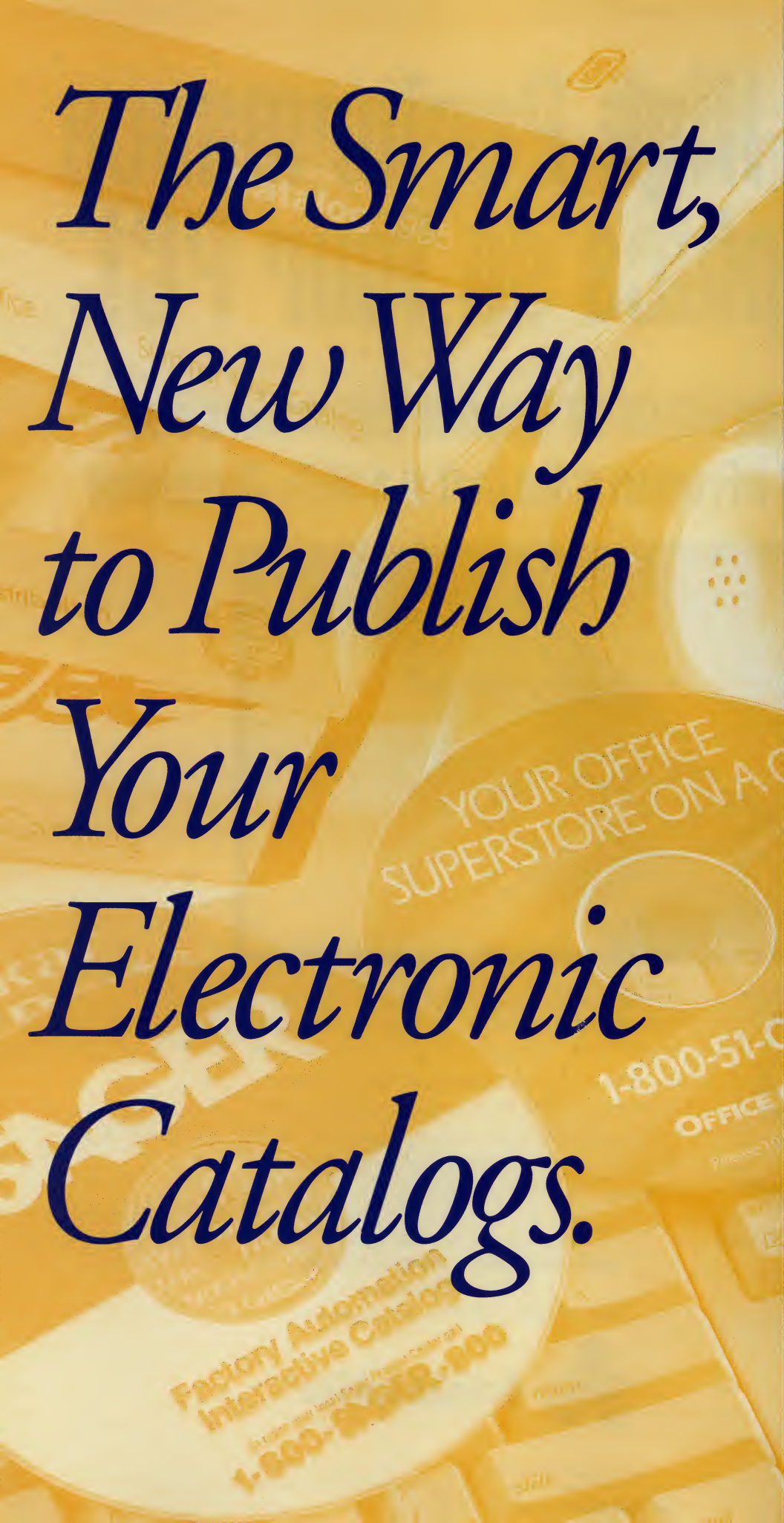
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how to PUT TOGETHER an INTERNET WEB SITE

PRESERVE THE STATE!

USING STATE DEPENDENT BEHAVIOR TO TRACK ACTIVITY ON YOUR SITE

magine that you work the stacks in a major metropolitan library. Yours is a high-volume job — people are constantly coming up to your window with numbers from the card catalog, and it's all you can do to remember who asked for what and deliver the proper book. Every once in a while, someone comes up to the window, asks for the last book they read, and you just roll your eyes and say, "I can't remember the title of every book that's requested by every person who comes up to my window. Tell me the title and I'll be happy to get it for you." This works fine until one day the head librarian tells you that budget cuts are forcing layoffs and they're only going to keep one librarian, someone who figures out how to give a lollipop to anyone who checks out each volume of the *Encyclopedia Britannica*. ■ "That's impossible!" cry your co-workers. "That would require us to remember details about every person who comes to our window. We just can't do that! We fetch books. That's all." ■ "Tough," says the librarian, fanning out a sheath of pink slips. ■ While everyone else is taking Mega-Memory courses and keeping voluminous notes, you win the contest easily. "How did you do it?" asks the head librarian, ripping up your pink slip and preparing to distribute the rest. "You'll never know," you respond, walking out the door. ■ In the following weeks you eke out a living as a World Wide Web site designer. At first this goes great — the Web is exploding and there's plenty of work for everyone. You design pages, put them on the server, and people download

BY LARRY O'BRIEN

how to PUT TOGETHER an INTERNET WEB SITE

them. Every once in a while, someone comes up to the server, asks for the last page they read, and you just roll your eyes and say, "I can't remember the title of every page requested by every person who comes up to my server. Tell me the title and I'll be happy to get it for you." This works fine until one day you're bidding for a job at Acme, and they tell you that they're only going to go with one firm, someone who figures out how to offer a special 10% discount to anyone who reads each of the pages describing Acme's latest widgets. "That's impossible!" cry your competitors. "That would require us to remember state information about every person that visits the site! We just can't do that! Web servers fetch documents. That's all."

There's something strangely familiar about the situation, but this time the difference is a lucrative Web contract, not dodging a pink slip from a minimum wage job.

What you did at the library was simplicity itself. When people came up to you the first time and handed you a request card, you'd fetch the book, but before you handed it over, you would surreptitiously tape the request card to the back cover. When people returned a book, they might have a new request card. If they did, you'd take the old request card off the back cover, tape it to the new request card, and tape them both to the new book. If they didn't have a new request, you'd read the accumulated request cards, which effectively listed every book they checked out. If they'd checked out enough *Encyclopedia Britannica*s, you'd give them a prize. If they hadn't, you'd toss the request cards in the recycling bin.

Your scheme was effective because it relied on the users, not yourself, to preserve information about their activities. Since most of them were unaware they were carrying this baggage around, you appeared to have a flawless memory.

Can you use this same technique on a Web site?

In fact, this is a key technique for creating truly interactive Web sites. While the Web as we know it is strictly a fetch-and-forward mechanism, Web designers with moderate programming skills can create pages that use the client's own browser as a data storage tool. This technique is the basis for not only sneaky customized things like Acme's selective marketing coupon, but also for catalog shopping, so you can do your part to transform the Information Superhighway into the Information Supermall.

Powerful States

To a programmer, the encyclopedia task in-

> **Web designers with moderate programming skills can create pages that use the client's own browser as a data storage tool.**

volves only three states for each person who comes up to the window — a person can have a fresh request card in hand but not a book (initial state), a person can have a fresh request card in hand and be returning a book (browsing state), and a person can be returning a book without requesting another book. Because we control how things go in and out of a window, we can know certain things about states that don't need to be made explicit. For instance, we know that when someone returns a book, there will be one or more request cards taped to the back cover. We know that if they return a book but don't request a new one, it's time for us to check if they deserve a lollipop. The Acme task involves similar states. Online catalogs have these states plus additional states in which users confirm their selections and pay for them.

Maybe in a real library we couldn't have that kind of control over how people come and go to a window, but if we did, we could rely on a person to always be in one of our defined states. They'd be mutually exclusive, and the transitions between them could be defined as precisely as we wanted. If you get your thrills from computer science, you'll be fascinated to hear that given a precise set of states and transitions, and accurate internal state data, you can always, 100%, absolutely, positively guarantee that the behavior of the system will be identical every time. If you have that information, you're set. A millisecond, a day, or a millenium can go by. Your hard disk can crash. You can swap out your CPU and do the calculations with pencil and paper. It doesn't matter. (Note for those interested in swapping out their CPU for pencil and paper: To precisely model the states and transitions of a six-million-transistor CPU may not be time effective.)

Like our reference stacks, only two things travel back and forth between a Web server and clients — documents and requests. Doc-

Interaction diagram for librarian task.

Customer — Librarian — Stacks

1: Return book
2: Remove set of Book Request Cards
3: Check for lollipop worthiness (analyze state)
4: Give a lollipop if worthy (act on state)

Start/Finish Line

5: Book Request Card
6: Fetch book
7: Preserve state by taping in Book Request Cards
8: Give book with embedded state to customer
9: Deal with other things/customers

uments go "down" the wire from server to client, URLs come "up." We'll use both of these to hide state data.

Preserving State in Documents

You can slip state data into an HTML document in three places. The most proprietary but flexible way is to use Netscape's "Cookie" HTTP header. This header, of the form: Set-Cookie: NAME=VALUE; expires=DATE; path=PATH; domain=DOMAIN_NAME; secure, is explained at http://www.mcom.com/newsref/std/cookie_spec.html. It has many options, the most interesting of which is that cookies can be time limited. It's not surprising to find such a capability in Netscape's browser, since such time-limited cookies are the foundation for some of the better network security schemes.

Another place in which to slip state data is forms, where a tag of the form <INPUT TYPE=Hidden Name= variableName Value= whatever> specifies a (you guessed it!) hidden field. This can be helpful in online catalogs, when you might want to get a list of items the person viewed but didn't buy, for instance.

The final, and most important, place in which to place data is in the URLs you send down the line. Use a question mark to end the URL and begin your state data, like this: <A HREF="cloner.cgi?StateData">Go to the target</A>. This is the equivalent of taping old requests to the back cover of books.

Reading State from URLs

When the server receives an URL of the form docname?StateData, a CGI script receives the stateData as a parameter. You can use it to control the behavior of your program. And, I'm sorry to say, program it must be. You can't do state-dependent behavior using static HTML files. At the very least, you have to append the state data to all outgoing URLs. If you don't, when someone clicks on that URL, the state data is lost forever.

Luckily, a program that takes a static HTML file and modifies it just enough to preserve state data is straightforward. The basic technique is to use a customized tag (say, [SPECIAL_TAG]) to indicate "Insert state data here." You then use a program to read the HTML file line by line and search for the customized tag. If it's found, you replace the custom tag with your state information. If it's not found, you send the data straight through. I call this technique "cloning." A cloned file is almost identical to the original, with the only changes being the state-dependent data you insert at the [SPECIAL _TAG]. Like identical twins, cloned files start out alike but end up being slightly different.

The listing above shows such a program. Notice that the URL is passed the state data as a single parameter, but there are two components to the data. The first component is a unique user identification. The second component, separated from the first by an "X," is the name of the HTML file

Cloner.CGI

```perl
#!/usr/local/bin/perl
# An example program to clone a file, but which allows for special
# processing of lines that include a tag of the form [SPECIAL_TAG]

# HTTP usage <A HREF="cloner.pl?fileNameXuniqueID">Link text</A>

#Split the argument line and set the unique ID and file to be cloned
@args = split('X', $ARGV[0], 2);
$uniqueID = $args[1];
$cloneDir = '/htdocs/exampleClonerDir/';
$cloneFile = $cloneDir.$args[0];

#Output the header — note double line feed
print("Content-type: text/html\n\n");

#If the file can't be opened, output a terse error message
open(CloneFile, $cloneFile) || die $cloneFile." Can't find requested
file\n";

#Cloning loop
$line = <CloneFile>;
while($line = <CloneFile>){
        $_ = $line;
        if (m/\[SPECIAL_TAG\]/ == 1){
                #If the current line has a tag of the form
                #[SPECIAL_TAG], do special processing.
        }else{
                #Since there was no [SPECIAL_TAG], just
                #print the line
                printf("%s", $line);
        }
        if(eof(CloneFile)){
                close(<CloneFile>);
        }
}
```

that will be "cloned." When cloner.cgi is called, it splits the parameter in two (using Perl's "split" function), stores the user's id in a variable, and begins cloning the file. Additional components could be added to the parameter; just use the "split" function to chop up the parameter into as many variables as you need.

Of course, special processing can occur at the beginning of the program when it first sees state data, as well as later when it's cloning the target file. For instance, in an online conference registration program I wrote for ALT.net (a Web consulting firm), once a person had indicated that they wanted to schedule a class, if the file to be cloned was the conference contents, the program would, in addition to the static HTML contents, send down a line like: "<P><H2><A HREF="scheduler.cgi? UserIDXSchedulerStateData">View your customized schedule!</A>"

Preserving state data is the fundamental challenge of programming the World Wide Web. The use of a cloner program to preserve state is the doorway to programming the Web as we know it. Specialized Web programming languages such as Sun's Java, however, have their own techniques. We'll discuss these in upcoming issues. 🐾

ABOUT THE AUTHOR

Larry O'Brien is Editor-in-Chief of *InterActivity* sister publications *Software Development* and *Game Developer*. Additionally, he speaks and consults on advanced programming techniques, object-oriented design, and hypermedia development. If you have a particularly interesting CGI program you'd like to share with the world, send details to interactivity@mfi.com.

Our story starts with The Letter. "Dear Blah Blah Blah, Congratulations on your new blah blah blah. I'm writing to make you aware blah, blah, blah. . . ." ▲ We get a lot of these things. They're accompanied by the usual promotional items — a press kit, photos, a disc or three, a video tape, more creative attention grabbers like T-shirts, coffee mugs, toys, cheesy desk clocks. They usually land in large piles at strategic locations throughout our editorial offices. What made this letter stand out was the next sentence. ▲ "We are on the threshold of releasing the sequel to *The 7th Guest*." ▲ *The 7th Guest* sold over 1.5 million copies. It was one of, if not *the* very first interactive movie. Stories of its making are legend. Two guys from Virgin Games, art director Rob Landeros and VP of R&D Graeme Devine, have lunch with Virgin Games bigwig Martin Alper to pitch him on an idea. Alper tells them, "Great, but I don't think your future is with Virgin." Stunned, Devine and Landeros walk away with a contract to

BY DOMINIC MILANO

OBYTE

INSIDE
TRILOBYTE

develop their idea with one condition: They aren't to set up shop more than 90 miles away from Virgin's Los Angeles offices.

Devine and Landeros promptly move to Southern Oregon, set up shop above a small tavern in downtown Jacksonville outside Medford, hire three people to fill out the Trilobyte roster, and get down to building an interactive 3D-modeled haunted house. A CD-ROM game in the decidedly not-multimedia-ready world of single-speed CD-ROM drives, expensive RAM, and virtually unaffordable mass storage systems.

They tell stories through puzzles that unlock rooms and trigger composited video passion plays between ghosts that reveal clues to what's going on. The ghosts are shot against a home-grown bluescreen, which leads to nightmares for the production team who have to literally handpaint every frame.

The 7th Guest established more than a few Trilobyte trademarks. The floating skeletal hand cursor that points the way as you move it; the pulsing brain in a smiling skull cursor that indicates you've found a puzzle; the spinning eyeball cursor that tells you where you can move a puzzle piece; and the infamous taunts of Henry Stauf, deceased owner of the mansion that serves as the venue for play in *The 7th Guest*, who chides you mercilessly as you try to solve conundrum after conundrum.

As a first generation CD-ROM-based experience, *T7G* broke new ground. It also broke a lot of rules — of course, this was before anyone knew there were any rules. In the Mac version, the music drowns out the dialog; the audio is not mixable. The video clips, once triggered, can't be interrupted, which in a house of puzzles and constant searching leads to frustration. How many times can you watch a ghost float down a hallway before you get bored? There was no way to look up clues other than to travel back to where you found them in the first place. There was no built-in mechanism to help you solve or at least circumvent complex puzzles. And if you couldn't solve the puzzles, you couldn't continue the adventure.

T7G was insanely successful anyway. Its sequel, *The 11th Hour,* has been much anticipated, and it's two years late in shipping. As I boarded the puddle jumper to Southern Oregon, my head was swimming with visions of an extensive case study on the making of *The 11th Hour — 11H* in Trilobyte-speak.

Were we in for a surprise.

• • • •

As marketing assistant Lisa Greene shuttles us to the front door of Trilobyte Central it becomes clear that the once lean and mean design team that spent its evenings watching bar fights from its second floor perch on Jacksonville's tiny main street has moved into decidedly more corporate digs. Passing through the reception area, which is lined on the right with various Best Of trophies and on the left with glass-walled conference rooms, I learn that Trilobyte has moved twice since its inception in 1989. The first move was out of the tavern loft and into to an old schoolhouse. The second brought them to this two-storied cubicle-filled office building.

Dumping my stuff on a convenient floor, we settle in with letter writer/marketing director/local chapter head of the Harley Davidson club Jane Le Fevre. "*11th Hour* is in final beta, but I thought you'd be interested in some of the other projects we have going," she says. "We'll spend the day making the rounds, visit the shoot that they have going across town, and if you're ready we should get started."

Shoot? What shoot? While I ponder and fumble around with my cassette recorder, Jane hustles us up a flight of stairs to a dimly lit room populated by a sea of cubicles, most unoccupied. A few heads pop up to check out what's going on in compositing artist Ray Manabe's workspace as introductions are made.

Ray is busy compositing Scooby Doo-like 2D character animation into a Scottish castle modeled in Autodesk's 3D Studio. The project, a *7th Guest*-like game called *Clandestiny*, is one of many the Trilobyte crew is working on simultaneously. Evidence of massive amounts of planning — thick books of storyboards and piles of animation exposure worksheets — are stacked on either side of Manabe's computer setup, which includes a Compac 486/66 running Photoshop, a scanner, and a P90 tower with 96 megs of RAM running Animo, a compositing system by Cambridge Animation. The operating system, I'm surprised to learn, is NeXT Step. Both computers are tied into Trilobyte's network asset management system.

Like many Trilobyte staffers, Manabe is not into computers. His thing is animation. He worked at Cambridge Studios, the animation company responsible for *Clutch Cargo* in the '50s, while attending college. After college, he went into advertising but came back to his first love two years ago after reading ads about what you could do with animation on the desktop.

Onscreen, a 2D animated guy walks through a door and across a courtyard. As Manabe describes what he's doing, it dawns on me that this should be more than a "hi, how are you" kind of meeting. I jab the record switch on. . . .

Manabe: If we were to move the camera over, he would actually be cut off at the end of his walk, so this whole scene is a matter of timing the camera so you don't lose the boy before the animation disappears.

How do you work out your timings?

Most of it is done visually. It's very quick, because in Animo you can change camera moves and see the results on a replay window [*points to a small image onscreen*]. After a while you get to where you can judge just exactly where the frame is going to line up.

So you don't use a stopwatch?

No. When we have to get that precise we can reference the animators' exposure sheets, which give you all the action in a scene broken down frame by frame.

Manabe points to the guy as the animation loops. As the character passes beneath a wall torch, he gets lighter. He gets darker as he passes

Trilobyte has grown from a staff of five to over 40 in just a few short years (yeah, we know there are only 31 shown here).

back into shadow. Manabe has added both effects by adjusting the tint of the 2D animation in Animo.

Manabe: That's not something you notice right away, but all those details add up to give you a sense of quality. It's all done to tie the 2D animation with the 3D backgrounds.

The guy walks behind a tree limb, and Manabe explains that they are using alpha channels to simulate multiplaner animation techniques as Clandestiny *director John Gaffey joins the discussion.*

Gaffey: The animation was done by traditional animators, so if something didn't show in the storyboards, they didn't draw it. That meant that if the boy walked through a door, their drawings would stop at where they thought the door was going to be. In the future, we'd have them continue drawing the character, because it would give us that much more latitude. Ray has had to spend a lot of time covering up missing animation.

Because the backgrounds are in 3D, we're able to manipulate them. That's marvelous because we have the ability to have the scene fall behind the 2D animation.

Manabe loads a scene in which a Captain Hook-like pirate, standing on a ship that's seesawing up and down as if rolling through rough waters, gets his leg shot off in the Warner Bros. tradition by an exploding cannon ball.

Manabe: This is one of my favorite scenes. The captain's antics are very funny. . . . Here I put the ship on one layer, the water in the background on another, and the 2D animation on another. You can see that the ship is actually moving up and down. To get that effect, I just moved the background. The explosion was created on a layer with a drawing in Animo. By making the drawing bigger and bigger between frames, we make it look like an explosion. There's also a smoke thing that was created in Photoshop. We airbrushed a black smoke circle, brought it into Animo, put a tint filter on it, and made it larger and more transparent over time. I add other camera moves to go along with when he gets his leg blown off. He loses his balance, hits the deck, and bounces. All the camera moves are not in the animation itself. I put those in to enhance the animation.

None of those camera moves was planned in advance? They weren't suggested by the director?

Gaffey: No. There are not more than a dozen planned camera moves and most of those were long pans.

Manabe: In traditional animation, you've got a cameraman who follows exposure sheets and the directions written on them. He takes those cues from the director. Animo lets you see the scene and start planning camera moves without an exposure sheet. My job is not like a camera-

In *Clandestiny* 2D animation is composited in a 3D Studio modeled world. Note the flames in the fireplace, produced by artist Robert Stein III with Alias.

man's. I've got more control over the animation. If you look at traditional animation today, you notice there's very little camera movement. Every move requires a director to tell a cameraman what to do, and the director can't sit there through the whole process, but he could sit down at a computer and view the animation. That would give directors more leeway to decide how to move the camera to enhance the scene, make it come more alive. Without camera moves, 2D animation looks static.

Manabe loads up a shot of the man entering a chapel, passing "under" an arch that's been added to hide the partially drawn boy as he enters the room. As he continues his walk, his hand rests on a pew. The camera is looking down on the scene at an angle. The 3D room and the 2D man appear to be on the same plane, despite the odd angle.

Manabe: He walks through the door back here, which wasn't there, so all of a sudden he appears. We put this arch in front of him on an alpha layer to mask the hole in the animation. The pews are on an alpha layer because he had to walk in back of them — the soundtrack for this is a German opera.

The camera follows the man revealing more of the church by pulling back as he enters the chapel, stops when he stops, then continues pulling back when he continues walking.

It would look very flat without the camera moves, but all the motion and the fact that he's behind things ties the 2D cell animation with the 3D environment.

So the 2D came first, which meant you had to match the scale of the drawings with the models.

Gaffey: We work with layouts and storyboards to do what we can. But we're still building parts of the castle, so there's no way, given the production schedule, that we could have built the castle first and then given it over to the animators. That's come back to bite us a few times,

where Ray's had to figure out how to hide things.

I'm curious about the process of getting the 3D environment and the 2D animation to exist on the same plane, especially at odd camera angles.

The animation is rendered out for angles like this [*points to screen showing the scene in the chapel*]. So all we do is try to match the angles. The closer we get, the more realistic it looks.

Gaffey: They gave us traditional layouts, and in the storyboards we could visualize ahead to see what we were going to have to do, but it really requires going into 3D Studio and moving the camera until you get it right. It's hit or miss. It could have been a real nightmare, but it's been okay.

Manabe [*switching to another scene*]: This features more smoke effects that were done in Photoshop.

So you're not using the Smoke IPAS for 3D Studio?

Gaffey: No. We use Photoshop, and 3D artist Robert Stein works in Alias.

The animation style is a lot more Scooby Doo than Roger Rabbit. . . .

Manabe: We didn't contract any of our characters to have shadows. So all the shadows you see are done by bringing the 2D character into the frame twice. We then paint one of the images black, tint it, blur the edges, make it transparent, and offset it. It works out pretty well, because it follows the animation pretty closely.

That's how a lot of print designers add feathered drop shadows to type.

Manabe: Yeah. That's how we've done it. You can add quite a bit of drama by utilizing that concept.

Anything that we can do to enhance the animation, to take it beyond the Scooby Doo approach where everything is flat. All the characters have a certain palette that was created for them. The palette can then be made lighter or darker, redder or greener or bluer, depending on the color of the background. Anything we can come

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up with to tie them in with the 3D. . . .

This is the first time we've ever tried this. Animation right now is on the verge of utilizing three-dimensional rather than flat painted figures. Since we've got the luxury of being able to create backgrounds right in the next cubicle, rather than calling an illustrator in and asking them to paint something, it's very quick. We can tell them we need a camera move and get it right away.

The 3D world was done in 3D Studio and the particle effects were done with Alias?

Gaffey: The final scene, Act 26 in the Dragon's cave, was done in Alias because it was better to do the cave's terrain geography that way. The opening scene, which has a lot of overviews, was done in Alias too. There's an overview of the castle scene that was also Alias.

Manabe: We originally wanted to do the dragon in 3D, but we just weren't getting what we wanted so we backtracked and did it in 2D. It would have been a lot of fun to see a 3D dragon.

I'm surprised you didn't do digital 2D animation using a package such as SoftImage's Toonz.

Gaffey: The 2D animation was done by an animation house in Taiwan. We went over there and spent four or five months with them doing the animation traditionally. At that point, we still weren't sure it was warranted to do it digitally. Actually, Graeme wanted to paint the thing digitally because he wanted what came to us to be digital assets, so animation director Aundre Knudson set up his own painting studio here. He uses AXA to do the digital paint. He likes AXA because Animo can deal with its file format. That caused some problems, because AXA is a Windows-based paint program

and let's say it might use different alpha channels. Animo is running on NeXT Step. So our guys had to write a utility that converts the alpha channel.

Manabe [*looking at an animation of a man eating soup*]: This steam was done in Photoshop, which is interesting because with Animo you can do a dissolve at the top and bottom of a frame. The steam is a long strip that flows through the frame vertically, but the bottom and top of the alpha channel are being dissolved so it looks like steam flowing upwards.

This scene is kind of cool [*calls up a view of the castle from outdoors*]. It's the first time the characters see the castle, and you're looking at it from the point of view of a character who wears glasses. At first, it's out of focus, but then the character puts his glasses on. As he lifts the glasses, you see the castle clearly in the lenses of the glasses. That was done by putting an animated still-frame of the in-focus castle that follows the frame of the glasses. There are two backgrounds of the same image. One has a blur filter on it to make it out of focus. The other has a mask on it that punches a hole through the blurry image. What you're seeing through the mask is the in-focus image that's slightly larger than the blurry one to give it that magnified look.

The story actually gives you the opportunity to try a lot of things. You read the script and think, "Gee, how am I going to do that?" So we sit down and figure out ways to do it that aren't really traditional in the sense that there's a method already established. Once you start to learn the program, things get a lot easier.

As you get deeper into the project, do you find that you can see a difference in quality between earlier work and later work? Are your techniques getting more sophisticated as you use Animo more?

Manabe: No, I don't think so. The effects have been sophisticated from the beginning. You just

learn tricks to make the process go faster.

Have you been aware of every scene that's coming up so you can plan upcoming treatments, or are you getting surprised as new animation is delivered to you?

Gaffey: Our first look is when the scenes come in from Taiwan.

Manabe: They have maybe eight different animators working on this project. You get to where you can spot their styles, and maybe three of them are really good. You sit there and go, "My God, there are certain scenes, movements of the characters, that are so well done," and others where you go, "Oh, that's terrible." And you try to cover it up.

Manabe pulls up another scene in which a woman appears in an outfit that starts glowing and changes into armor.

Manabe: This was two scenes that overlapped. One fades in and one fades out. Robert Stein did the swirling effect over her body in Alias. There's a rack-focus thing, so when she walks toward the camera the background goes out of focus. Animo was used to create the lightning effect that goes in and out around her body.

Another scene switch. This one is a figure swimming underwater with bubbles trailing and a school of fish passing from the opposite direction.

Manabe: In this piece, the only 2D animation was the figure, which was painted black, the strip at the top of the water, and the bubbles. We took the background image and doubled it. One was run straight for the above-water effect. The underwater part was given a greenish tint. We also put a ripple filter over the animated figure. The ripple affected the water layer above, so we masked it off. Then we brought in the fish and put a ripple filter on them too. We use them as a vehicle to move the eye over to the figure. The underwater areas that aren't so greenish are on a separate channel . . . the figure is swimming out through a cave . . . we did one on the bottom, turned it upside down, and offset it. Those have a ripple filter on them.

The fish move at a different rate than the background to give the scene a sense of depth. The fish were done by Andy [Anderson] in Photoshop.

How is all this going to look compressed?

I was actually quite impressed. I was expecting more pixelation. I've seen stuff from other developers that's heavily pixelated running at 15fps. When I saw our proprietary compression running on Graeme's machine at 30fps I said, "Wow." Before, I was wondering if all the detail I was putting in was even going to be visible. After seeing it I went, "Yeah, I'm going to do all this work." If the codec wasn't as good as it is, I wouldn't need to be spending as much time as I am putting in all these details. We wanted people to swear it was coming right off TV. I think we'll do it. ✸

Another *Clandestiny* scene in which 2D animation produced in Taiwan is composited with Animo software into the 3D world. Third person POV is used throughout the game allowing the Trilobyte crew to use cinematic camera angles.

CLANDESTINY LEAD ARTIST
ANDREW ANDERSON

The next cubicle on our interoffice tour is home to a medieval chair (a prop from nearby Ashland, Oregon's famous Shakespeare Festival), a PC, and Andrew Anderson, a fine artist turned carpenter turned 3D Studio expert. His relationship with Trilobyte began when he did contract work on *The 7th Guest*. In his words, "I was a digital janitor — there was a lot of cleanup work to be done on the video compositing." After building almost all the sets for *Dog Eat Dog* (a title still in development), Anderson decided to join Trilobyte full time. With the how-do-you-do's out of the way, Anderson describes his life as *Clandestiny*'s art director.

My role is to design the overall look of the environment in which our 2D characters interact. We started doing basic overall design of the castle back in October. We're nearly a year into it. Initially it was designed to be seamless. So unlike *7th Guest* or *11th Hour*, where there's a blackout when you go from one room to another, you'd see the transition from one room to another. Since then, we've gone through all kinds of ideas about how we're going to do the navigation. Right now it's up in the air. It may be *Myst*-style easy-to-make transitions, or it may be the more visual, yet laborious, animated version. Or it could be a cross between the two.

It's been really fun to design. I've always liked medieval architecture. Carl "Chip" Jackson did the other half of the design, the floor plan, before I started on the project, so it was easy to take his floor plan and embellish the look.

Our difficulty was to try to get 3D Studio, which is very mathematical software, to be cartoony looking. We managed to achieve that, but the problem remained that the meshes became very heavy. The more curvature you have, the

"This clock is more than 4,000 faces. Some of our scenes have 600,000, that's about 16 megs. We try to render with reflection maps off unless we need them for something specific and hide as much as possible. On the 64-meg machine it takes about 20 minutes to render," explains Anderson. "You can see how things are warped. There are hardly any sharp edges. You have to use the Bevel Tool to make everything round."

more vertices you have and the more file space you take up. Some of our files were up to 20 megs. It takes a pretty powerful machine just to hold it in memory, not to mention render out single images.

At this point, we've got the entire thing designed. Now I'm working on backgrounds for Ray Manabe. Backgrounds can be somewhat difficult, because at times I have to render various layers on alpha so he can arrange and compose them. We're all surprised at how well the 2D and 3D integrate. There was a lot of initial wondering about how these flat characters would look with all this volume, lighting, and shading around them.

We discovered Animo can do a lot of filtering and shading, which really helps integrate the characters.

I'm curious about your techniques for getting the planes to match between the 3D and 2D worlds.

Yeah, it's been a challenge. I've had to take as many as three, sometimes four, goes at it. We may do it four times and then realize that Ray needs part of it on alpha so he can continue to adjust it.

The other thing we had to deal with is that the 2D animators use registration lines, so when a character enters a room, he's cut off straight at the edge so there's no give and take. Ray would have to do a lot of masking. I'd have to do things on channels so he could juggle it all together.

Basically, it's setting up cameras and trying to judge as best as one can the angles that are going to match. Between all of us, we've succeeded.

How many modelers do you have working with you?

It's been four. Tom Collie and Linda Sturgeon worked on specific objects. Ken Nash worked on puzzles. Pretty much it's been Carl and me. He did most of the architecture. The rest of the crew filled in with furniture and objects.

Do you build every object yourselves, or do you use libraries?

Before I joined the project I was subcontracted — I worked with CyberRom, who are based in Ashland. They do a lot of game development for various other companies. We developed a line of Middle Ages furniture. So from June until the

If you look carefully, you'll notice that there are virtually no straight lines in this scene from *Clandestiny*. The artists on the project worked hard to get non-CAD-like cartoony images out of 3D Studio. The books and objects on the shelves are bump and opacity maps. The objects that take your attention, such as the globes, table, and benches, are modeled.

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time I joined Trilobyte in October, I was building objects. Chairs, tables, things to fill up the empty space. Some of the furniture actually came out of *The 7th Guest.* Trilobyte has a lot of furniture that fit quite well with a little modification, bending trying to get that cartoonish look. But achieving that look has been a challenge.

Did you redo the texture maps?

Yeah. For the stuff we used out of *7th Guest,* because that stuff was built to look as realistic as possible. We had to specialize all our maps to make the grain in wood look exaggerated. A lot of our time was spent map making. Stones, woods.

What software do you build your textures with, Photoshop?

Usually. We tried to have things look hand-drawn, so we did very little scanning to appropriate textures. We also stayed away from li-

"I'll embellish a lot of these backgrounds in Photoshop, despite how nice they turn out in 3D Studio. I'll push the contrast and color saturation to get as much as I can," says Anderson.

braries of textures. We spent a good third of our time painting maps.

What are you running on?

We always want faster, bigger machines. Right now the machine I have is a P90 with 64 megs of RAM. I have a gig of storage, but I rarely use it. I just put what I'm working on on the network. All our rendering is done on a network anyway so it's much faster just to store my files there.

What's your rendering network made up of?

We have two P100s. One has 64 megs of RAM, the other has 32. Of course, everyone vies for the speediest machine. Often Robert Stein puts his machine, a P100/96, online. We always want more memory, more speed. We'll probably see more hardware get upgraded when *11th Hour* ships, but for now we're using what we have and seem to be getting by without too much frustration.

You know, networks are networks. There are times when they don't work right. But there's always something else to do running on your local drive. Although there are days you feel like you're in a race with two left shoes on.

There seem to be a lot of staircases in both

Clandestiny *and* The 7th Guest.

Yeah, there are a lot of spiral staircases. We would like to review a lot of motion navigation, because the sensation of moving up those is captivating. When I first saw *7th Guest,* that's what captivated me as an artist. Although we know that game players get tired of trudging up and down stairs.

I've heard other 3D artists complain how difficult it is to build staircases. Did you find them challenging?

Not particularly. A lot of things are symmetrical. Once you have one wood turning, staircases have a number of them, so you take one and bend and modify it. Once you get your elevations and angles right, it's not so difficult. I think I have an easier time because before I was a computer artist, I was a painter and sculptor, but I made my money as a carpenter. I spent a lot of time making real staircases. That helped a lot.

In 3D Studio, you use the measuring tool. Some people build on a grid. I tend to use a more intuitive approach with a lot of measurement and calculation. I think once you build a couple, they become easier.

What were some of the things you did to make work done in 3D Studio look more cartoony?

A lot of the preliminary drawings put us in that mode. It's easy to create a chair in 3D Studio that looks quite splendid, but it doesn't have that bent look. So we started thinking about the lines of things. Trying to loft something like that is entirely different. When you got down to the vertices level, you bend and twist things. When we mapped things, we did a lot of face dissection. We'd take faces off so the grains of wood would run in different directions. You can also use their Displace module, which allows you to push and distort the mesh, but the hardest part is having all these vertices on objects when you're trying to include them in an environment. It gets slower and slower. Using an Optimize IPAS helps, but if you strip too many faces off sometimes they tear a bit. So to keep their integrity, they need a certain amount of vertices.

Trilobyte has tried to hire people who are artists first. They know they have people who can draw and design. If you can do that, you can take a tool and make it do what you had in mind.

There are things you can do to make things look more warped. I don't know if we did all we could, but it's like any project — by the time you're done, you realize there are things you could do that you didn't at the start. Artists will sit around and refine things, but there are deadlines, so our best attempt was to give it an overall look that was consistent.

It's the same with lighting. You want to have lighting that looks unique yet consistent, so you can go from scene to scene and not have things

look too disturbingly different. With the right kind of lighting you can do quite a bit. Lighting is half of the look. You spend a lot of time adjusting the lighting. It's fairly tedious, setting a light, looking at the effect. It's repetitious.

What's been your biggest challenge?

Day by day, my biggest challenge is keeping my enthusiasm up for the project, because it's repetitious. You have to do things three or four times, and that gets frustrating. But it's a really good team of people here. We probably spend an average of 10 hours a day, more now that we're nearing the end. The inspiring part is the group enthusiasm.

I had to measure all of my rooms to a wire frame map of the entire castle to make it all seamless. Building everything to the proper size was a big struggle. Generally in 3D Studio, you build everything in the center of the world. You couldn't build off a grid because of the things that are warpy. Besides, when you have various different artists working, you never know what you're going to get.

How did you keep the proportions consistent between the work of the various artists?

We'd have them build in architectural mode to keep things in proportion. Sometimes beginners just start building. They don't set up their units right away so you end up having 100-foot chairs. Basically my job is to resize and make things in proportion.

One hard part was with these big open spaces where the doorway reveals other sets. That's where we used to have a blackout between sets, because when you start sticking all of it together, the files get really huge. Some images are 16 megs. So by the time you bring one up and render it once, your machine is already swapping to the hard drive for memory.

One of the design flaws of 3D Studio is that if you use up all your memory and load another project, it doesn't clear the memory. You have to go back out to DOS and clear the slate.

You did compositing work on The 7th Guest. ***There have been lots of horror stories about the bluescreen work. Did it really need to be cleaned up frame by frame?***

Yeah, pretty much. We used the old Autodesk Animator and sepped out the background color. It was all actually done on a bluescreen. They use green now. But having never shot that kind of work before, there were issues of proper lighting; they realized people's hair can't be too puffy. We spent a lot of time clipping out frame by frame . . . we did 11,000 frames. We also did a lot of the special effects. That was the fun part.

By the time they did *11th Hour,* they had a lot better idea of what they were doing, although they took a lot of that work up to Portland. But Graeme also developed some tools to strip out the green to an alpha channel. Plus better knowledge of what you can and can't do. You can't have a bluescreen and have someone wearing blue. That kind of thing.

11TH HOUR
THE DETAILS

O ur Trilobyte tour gets nonlinear as Le Fevre pulls me out of in-cubicle conversation mode and takes me on a cruise through the gorgeous Southern Oregon countryside to get checked into a bed and breakfast. On the way, dodging head-on collisions, Jane makes celphone calls to get copies of the images I've been looking at over people's shoulders so this story will make sense.

The car swerves into a pebble strewn driveway. "Recognize it?" she asks.

I do a double take. The Victorian house we're stopped in front of is the Stauf Mansion. Le Fevre explains that the family living in it is pretty patient with all the tourists who come by to have their pictures snapped standing on the front stairs. Rob Landeros and Robert Stein used the place as their inspiration for the location of all the gameplay in *The 7th Guest*. The Stauf Mansion's famous staircase was based on the real thing, though most of the rest of the place is a 3D fantasy. In producer James Yokota words, "it's a bunch of disjointed environments built by Landeros and Stein."

11th Hour takes place in the Stauf Mansion, but it's 70 years later. One of the most noticeable changes to gameplay is the extended video intro used to set up the story to come. In place of Ego, the character whose point of view you assumed in *T7G*, you are now investigative reporter Carl Denning. Someone you care about has disappeared and you're out to find her. Naturally, you're led to the infamous Stauf place. On the way there, you watch Denning ride his Harley down the same country roads Le Fevre's been taking me through. There are flashbacks to a lover's quarrel in a diner that's obviously in downtown Jacksonville. Eventually Denning walks up to the Stauf Mansion and checks his pocket PDA (a new feature of the game that al-

The infamous Henry Stauf, whose haunted mansion is the venue for both *The 7th Guest* and *11th Hour*, was played by Rob Hirschboeck.

lows you to access clues at any time and ask for help solving puzzles). The entire intro is 100% video — no compositing necessary. The navigable 3D world doesn't kick in until Denning gets in the front door.

The compression looks fantastic. The video, 640x320 in true color and running at 30fps, is practically artifact-free. The 3D stuff looks even better. Producer James Yokota explains, "The added visual detail gave our old *7th Guest* encoder problems. We had to improve the image quality. There were two ways to do that. Improve the compression, and make sure we had the cleanest source assets with greater color depth. So Graeme set forth to do that. The second thing that affected our technology was that we had so much video footage. There are 65 minutes of video. We wanted to go into MPEG. Graeme built a software MPEG encoder/decoder that played back faster than most MPEG cards we'd seen at a lot better detail and frame rate. But we could never get the compression down to where we wanted it. He decided to build our own codec.

"We double-buffer our screen," he goes on. "We shoot every other frame into the buffers, which gives us an easy 30fps. We can also scale it down to 15fps if the consumer's hardware can't keep up."

"We shot *11th Hour* on Beta SP," adds director David Wheeler. "You know that 30fps of interlaced video is actually 60 fields per second. We freeze each frame, scan it, and compress it. But as you freeze frames, the interlace goes back and forth between fields, so we have to drop one field. *11th Hour* is huge. It's got something like 535 gigs of uncompressed data, which would be something like 78 discs, but our compression technology squashes everything down to four discs."

According to Yokota, the first thing Devine told David Wheeler when they started shooting was not to do too many fast cuts and not to move the camera. "So day one of the shoot," says Yokota, "Wheeler goes out with a truck and a motorcycle and does both."

From what we've seen, the codec handled it just fine. "One thing about video is that the field of view is so different from film," says Yokota. "Focusing is much easier, softer through the camera. So for the shot of Denning and Robin arguing in the diner with brick work in the background . . . what Graeme had to do with our compression codec was learn to recognize what's important. You don't need to see the bricks very clearly. You need to see Robin. So Graeme built in a motion compensation engine, an algorithm that works very well with the background. So now the bricks look more like film."

Turning the conversation back to game design, I learn the original plan was to give Denning a tape to access his notes. That idea turned into a PDA, which includes a help feature that allows players to ask for clues. If they're stumped they can ask the computer to solve a puzzle. If they're playing an AI game, where there is no single best solution because the game changes with every play, the computer will make the best possible move for you.

Does the player see the solution to a puzzle when the computer auto-solves it? "We don't

A gruesome greeting awaits in the bathroom of the Stauf Mansion in *The 11th Hour*. Unlike *The 7th Guest*, players of *11H* can interrupt video clip playback at will.

show you the solution, so you can always come back later and work it out yourself," Yokota explains. "We bandied around the idea of having graphic auto-solves — it's actually one of the directives on *Clandestiny* right now. It's one of those ugly fiscal things, because it might undermine being able to sell a strategy book. You'd be able to see every single solution and now that consumers can capture screens, we'd never be able to sell a book."

In a manner similar to *The 7th Guest*, puzzles are used to unlock access to rooms. Players also have little clue as to how the puzzles work until they start fooling around with them. And for those fans of *T7G*, yes, Stauf still taunts you as you struggle with puzzles. A typical Staufism: "It would help if you weren't such an illiterate."

He also picks on journalists, which is fitting not only because it's Denning's profession, but because Yokota and co-producer Kellyn Beeck both have degrees in journalism.

"The drama in *7th Guest* was based on solving puzzles and re-entering rooms," says Yokota. "The *11th Hour* is tied to 142 treasure hunts, the rooms are opened by the puzzles. We say it's Stauf's way of challenging the player to get through it. *T7G* made you sit through all the video clips. *11H* lets you click in and out of them at will. We've got interruptible navigation too, so if you want to skip all the walking sequences, you can just skip ahead to the new location. For instance, if you were at camera position 5 in the main hall in *7th Guest*, to go up the stair from that location you'd click to go over to the end of the room, turn around, and then click to go up the stairs. Now we've scripted the moves so you can just jump straight to where you want to be."

All of the video clips and clues are designed to propel the player toward the climax of the game, which after encountering one last puzzle (the only puzzle that can't be auto-solved) takes place at the 11th hour, when you have to make a moral decision. It's very melodramatic. And we'd rather not spoil the fun by telling you anything more.

Once you/Denning are in the house, the familiar soundtrack kicks in (once again, it's written by George The Fatman Sanger, who Yokota affectionately refers to as $, the artist formerly known as The Fatman). Rather than the pristine victorian mansion of *T7G*, you're now in a run-down, mold-filled old house. "The rooms are all in the same place, but the everything is trashed," Yokota tells us.

There are no lights. The only illumination comes from the flashlight you/Denning are carrying. Its beam bounces as you walk. "Robert Stein really did a great job with the flashlight, Yokota says. "It just didn't feel right floating around the way you did in *The 7th Guest*." 🦋

3D ARTIST ROBERT STEIN III
ON PARTICLE EFFECTS FOR CLANDESTINY & MODELING THE 7TH GUEST & 11TH HOUR

Robert Stein III worked with Devine and Landeros at Virgin Games in L.A. when it was known as Mastertronic. Stein had already moved to Seattle when Devine and Landeros started Trilobyte. When they called Stein and asked him to join them, he brought along a demo of some things he'd done while messing around with version 1 of Autodesk's 3D Studio. "They were iffy as to whether they were going to draw the graphics or use video or whatever," Stein says. "I convinced them that 3D software was the way to go."

He is still an independent contractor to Trilobyte, though his tenure rates him his own office away from the cubicle farm. On his desk is a PC. Across from it is an SGI Indigo 2 Extreme on which he's been doing particle effects for *Clandestiny*. Stein seems like a no-nonsense kind of guy. We waste no time getting down to business.

Was 7th Guest *done with 3D Studio version 1 or version 2 by the time you finished?*

Version 2.

Now you're using version 4?

Yeah, but of course, I've moved on to Alias. It's got several very nice features, like the particle system. It can do some very convincing fire and smoke and clouds. It's a bit expensive and I find it difficult dealing with Alias as a company.

Why Alias over SoftImage?

It's a better modeler. It's been viewed that way for a long time, whereas SoftImage has an edge for animation. All the big houses seem to have all of them — Vertigo, Alias, SoftImage. They work back and forth between them and they have to write a lot of proprietary code. We didn't want to have to write a lot of proprietary code so we went with Alias. The lighting and special effects were superior. And that's what I wanted.

This is a test of a cloud-like object. You can get some very realistic stuff going, but to render this takes about an hour a frame. It's about 60 frames, so it's more than overnight. We need to bring a renderer in here like a [Silicon Graphics] Challenge server, but to take advantage of the multiprocessor rendering, you've got to spend more on software so Alias will speak to multiprocessors.

ILM models with Alias on a couple of Indigo 2s, but they do all their rendering with Renderman on HPs. I heard through this Internet newsgroup that they're writing an Alias-to-RIB exporter, so I want to get my hands on that.

You're running Alias on an Indigo. How is it configured?

I've got two and a half gigs on here and I'm still clearing off drive space to make room for my renderings. It's just not enough. We've got a network with 28 gigs online and we're cleaning off drive space because that's still not enough [*laughs*].

Right now I'm rendering a generic flame effect

Artist Robert Stein generated all the smoke and flame effects for *Clandestiny* using Alias running on an SGI Indigo 2 Extreme. Even with 2.5GB of internal hard drive and 28 more online, he tells us, "I'm still clearing off drive space to make room for my renderings. It's just not enough."

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that's 128 megs. For some reason, Animo 2D is doing something to the alpha channel — making it more transparent than it should be. I've been working with the guys at Cambridge to find out why that is. They seem to know that it does that, but they don't seem to know how to stop it. So we're going to move some of the compositing tasks over to Premiere or 3D Studio, whatever. I'll be compositing the smoke for this particular scene in Alias. We'll use whatever works.

But now we've got to start thinking about getting some real compositing tools in here like Flame or Wavefront's Composite. With all this film stuff coming in and 2D animation stuff, we need more control than just these add-on features.

I was surprised that you weren't using Toonz or another 2D animation package.

We had it all done out of house, but I don't think Toonz was looked at. I think it just came out at the time we were thinking about 2D graphics. The people at Cambridge were very helpful to our needs, so that's probably why we went in that direction. Although in retrospect, we should have chosen the same tool the folks in Taiwan were using, which was AXA. Or had them use our tool to reduce the number of tools on this project.

When you're building flames or smoke effects do you try to match lighting effects or take into account the overall color scheme of the scene?

In this one [*points at the generic flame/smoke effect on screen*] I just said, "Here's flame." Because they asked for a generic one. At 640x480 they can scale to whatever they need. In this example [*opens the scene at the top right of this page in which is a guy is standing in front of a fireplace; the camera is slightly askew Batman-style; there are three lightsources — candles — marked by stars on the composited scene*], there was a light over here that's kind of purple-ish white. These two are kind of orange . . . [*opens three variations of the same scene*]. Here's no lights. I didn't like
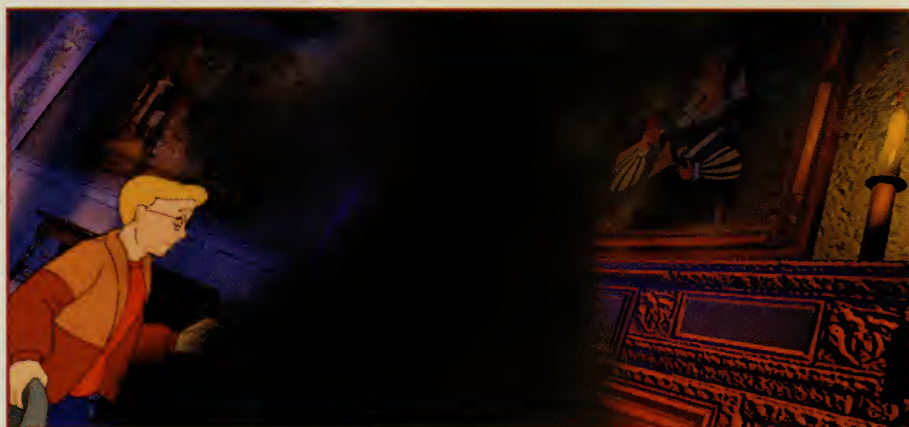
Stein went through three variations on this scene to get the column of smoke, which he produced with Alias, lit just right. "I settled on the one where you're picking up a little of the light on the left, you're picking up a little yellow on the right edge," he explains.

that. On these, I was messing with the amount of light on this area [*points to the left side of a pillar of smoke with various degrees of light on it*]. I settled on the one where you're picking up a little of the light on the left, you're picking up a little yellow on the right edge.

So if I'm doing the compositing, I take that into consideration, but I can't always take those things into consideration when I'm building blind. There are things Ray can do at his end. Change the tint or the color . . . he wouldn't get the light on the smoke.

Are you actually putting in the lights as well?

No. This background scene is rendered by Andy or Chip in 3D Studio. So they put in the lighting you see on the wall and on the fireplace. My light, I just put in places that kind of represent where they could be. They only affect the smoke. If I had fog in the room, it would affect the fog and therefore change the background colors of the room.

What was your single biggest challenge on this project?

Trying to match the background to some of the 2D animations. Say you've got a car on a winding road. And there's a rock in the way, so the car goes behind the rock. Well, the Taiwanese animators, working in their traditional form, don't

draw the car when it goes behind the rock. It just disappears. What we really needed was that car to continue all the way so we could move that rock. This was not communicated between us and them. Since we work differently, we have different needs. So we have to make that rock bigger now to make sure there's that overlap and there's no way we can move it or alter it. We're stuck having it be one way. I would do that over. I find that time consuming, tedious — shifting stuff, re-rendering, finding out it's not right and starting all over again until you get it right.

Particles and things take a long time to render, but it's a free flow kind of thing so you're not limited by a lot of constraints. If I had to make smoke to cover up a car that disappears I'd be in real trouble [*laughs*].

We're looking at a scene in which the camera is tilted. When you're building smoke or flame, do you take into account the angle of the camera?

With the Shader Editor, there are various properties that you have control over. First you've got control over the speed the smoke is coming out of an object, so at first you want to deal with it as if it's in a flat world and then you'll rotate the camera so it'll end up looking like it's part of the composited scene. You can adjust the buoyancy, but that'll still make smoke that rises straight up. The only way I could get an angled smoke movement without tilting my camera would be to create a wind force that blew it off at an angle. But there's no point in going to that much trouble when all you have to do is move the camera. You don't have to be that exacting.

Placing objects in a scene when they rest on the floor in relation to other objects is when it becomes complicated. You have to worry about the shadow on the floor and on other objects. Fortunately, Alias has a neat feature where you can make a transparent plane with the object on it. And cast a shadow on the transparent plane so it looks like it's part of the background image. It works most of the time. There's some lighting quirks that make it difficult, but you can fake things pretty well with a bit of tweaking.
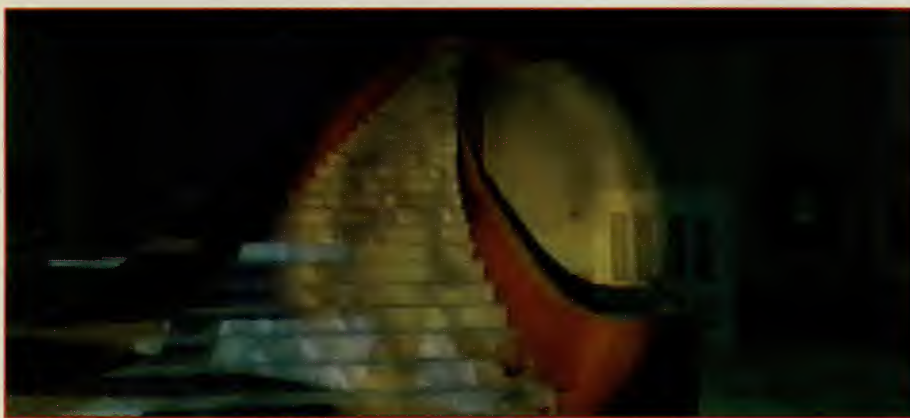
The famous Stauf staircase as seen in *The 11th Hour* illuminated by Carl Denning's flashlight, which bounces and pans as you explore the dark and thoroughly trashed mansion.

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Could you explain what techniques you used to get the 3D world and the 2D animations to line up on the same plane?

We were considering making a transparent dummy mannequin that would cast a dummy shadow on the 3D Studio scene based on the 2D animation. But . . . too much trouble [*laughs*]. Maybe on a smaller project. Maybe next time.

Where did the decision come to use Scooby Doo-ish animation instead of Roger Rabbit-ish stuff?

You know, I came on this project late. I was working on another project called DNA, which got postponed. I wasn't part of the decision making process. As I recall, we were going to go for a more Roger Rabbit kind of thing. That's one of the reasons we got Animo 2D, because it's capable of doing that. That was at a time when we were planning on doing all the animation in-house too. When those plans changed to send it out of house, I'm sure there was the concern, you know, none of the detail, cost, what their tools could do, and all that. Weighing all those decisions they decided to let it go.

It does integrate very well though. . . .

It does. It integrates a lot better than I anticipated it would. It feels like they're in the scenes. It's fun to look at. People seem to like to look at it. Me, I'm not sure I would choose to go with 2D characters. Motion capture is getting to where it's very acceptable. So the next project I want to do would be all 3D. No live actors. No 2D animation. It would be all 3D motion capture stuff.

Facial expression capture as well?

Yeah. Just for the sake of keeping the amount of work down, you'd probably reduce the amount of closeup facial stuff that you would normally do if you were a movie director. You have to just deal with things a little differently.

I notice here that flames done with Alias always look better if they're far away [*laughs*]. So maybe that's the same thing with motion capture. A little bit farther away, it looks a little better. But people are so critical when you're dealing with faces you can't get away with a lot.

Have you seen the work that's being done by the BBC in England on Ratz? *They're using Sim-Graphic's technology to capture facial expressions and mapping them to animated cartoon characters in real time.* [*Stein has a copy of our premiere issue on his desk, which features some images from Ratz and details on SimGraphic's stuff, which I point out to him.*]

Good thing I have that issue [*laughs*]. Of course, what I'm looking for is a little more realistic. I want that tweak in the chin, the squint in the eye. So one of the things I was looking at was Flesh. It's a great 3D painting tool. Wonderful textures, wonderful demo at Siggraph of two characters boxing. They had all the life and char-

acter expression you'd expect. Still a little cartoony, but they had all the stuff happening. Punches, pain, sweat. All that stuff. It's great.

Of course, it only runs on the SGI, but it imports and exports 3DS files, and it's probably one of the more versatile 3D painting programs. It has better control over the 3D mesh.

It's better than Alias' 3D paint program or the 3D Studio IPAS?

From what I saw, yeah. Obviously, if you had Alias, you might want to get their 3D paint program because it's an integrated thing. I've seen the 3D Studio IPAS and wasn't that impressed with it or with the Evans and Sutherland program either. I got a videotape of that a while ago. It needs a little work. But they're all on their way. It's an emerging technology.

What was your role in The 11th Hour? *Were you modeling on that project?*

Predominately. In *7th Guest*, we had several artists. Two inhouse, Rob Landeros and myself, and a bunch of outside people. But in *11th Hour*, all the meshes were built, so we decided to keep the staff as small as possible. I was the lead illustrator on the project. I put all the rooms together, made them dirty. Added new furniture. Integrated the new puzzles.

We had just brought on Ken Nash and John Gaffey. Chip was doing only 2D stuff at the time, so Ken and John helped out a little with building new objects. It was a more streamlined project. It took about a year. All we really needed to do was dirty the house up.

We worked heavily with 3D Studio, beta testing version 3 so we could get those multiple texture maps, bit mapping the light so we could simulate a flashlight. Before that, all we were going to do was overlay something in the video post so the light would shine around the room, but it wouldn't bend around furniture like a real light would so we were pleased to get those features in.

It's nice how the flashlight bounces up and down in an exaggerated fashion when you're walking.

Yeah, we wondered about that walking effect. We dabbled with it a while. At first it was a little too much. Then we thought walking straight wasn't enough. Hopefully we found a nice middle ground. I'm sure some people won't like it.

So how did you do the flashlight effect?

We painted it in about 10 minutes.

Tell us how to dirty up a 3D world.

With version 2, which didn't have multiple maps, it would have been a real pain. You would have had to have taken your wallpaper texture that you put on all these different walls and then make separate versions and save them out as files — one for wall 1, another for wall 2, *ad infinitum* throughout the house.

Another thing we came up with was using a transparent plane placed very close to the wall using an opacity map. But that posed a few problems because when faces got too close together 3D Studio had a co-planer face rendering

problem. So when we got the multiple maps in we didn't have to keep your dirt separate from your original wallpaper and we didn't have to repaint over things. But what it needs is more than just a second texture map.

In Alias, you can keep adding them on — I don't know how far it goes, maybe 64 before it crashes, I don't know. But 3D Studio needs a couple more layers. Generally that extra layer got me what I needed. There still are places in there where I used a couple faces with opacity maps to add some special stain that had to appear in a specific spot. But most places just had a second texture map.

What about all the debris laying around on the floor?

That's mostly textures. Sometimes it's actually little objects, but that just ups your rendering time and doesn't really add that much, especially if you zoom in. You get this chunky thing that doesn't look very good.

It must have been fun trashing the house.

Yeah. It was. I wish I could have done more. Spider webs are a difficult thing to do. It would be nice to have some kind of IPAS that you could give some parameters to, like, "Here's the edge of a banister. Here's the wall. Fill it in with a web."

I would imagine you could fake the gauzy kind of web with a smoke effect. . . .

Maybe. I don't know. I hadn't thought of that. Usually webs are so tedious and specific because the way they contact is so specific. And you can usually only deal with them on one plane between two objects. When they start draping and hanging between multiple objects, you're in real trouble.

3D Studio doesn't have the real atmospheric effects that Alias does, so that's one thing you won't see in *11th Hour*. It would have helped a lot to have that dusty appearance going through the house. Even different densities of particles of dust, you know you're in a real dusty place and shine a flashlight and big chunks go through the light.

The more you do, the more you want to do. Now that I've got this great cloud particle system, I want to do cirrus clouds. Stringy clouds, and I can't. I can do great billowy clouds but I can't do these others!

It was interesting to hear you say earlier that you didn't want to do a bunch of proprietary code to enable multiprocessor rendering, because the Trilobyte authoring environment is based on all this proprietary stuff.

Graeme certainly knew from the beginning that *7th Guest* needed a new kind of code to run off a CD-ROM, to take advantage of the new medium and all the data while overcoming the severe limitations of the 150k transfer speeds of the single-speed CD-ROM drives we were dealing with at the time. We knew that was going to be a bear. Who knows, maybe someday we will be writing all kinds of inhouse code for rendering. ✿

DIRECTOR DAVID WHEELER
EXPERIMENTS WITH INTERACTIVE DRAMA IN TENDER LOVING CARE & 11TH HOUR

The major surprise of our two-day visit to Trilobyte comes when we stop at yet another private residence in the country. Fronted by a very large open lot filled with vehicles — four-wheel drive pickups, compacts, a motorcycle or two, and a few house trailers — the structure is crawling with movie production stuff. Hydraulic towers support massive lights two stories in the air on all sides of the house. Thick cables snake across the front steps, around the swimming pool, up the side walls, and through open windows. As we approach the main entrance, a woman with a walkie talkie yells "Quiet on the set!" From deep inside a male voice announces they're rolling.

Someone's dream house has been commandeered and turned into a movie set. Strewn about the living room is a sound recording rig and a rack of video playback gear. An army of folks wearing short pants, T-shirts, and hiking boots hustles to get whatever it is they do done. Almost everyone has a walkie talkie. Signs on the kitchen table warn "Do Not Disturb, Hot Set."

People say hello as we pass on our way upstairs where a 35mm camera complete with in-lens video-assist mounted on a very professional looking dolly is pointed at a guy who looks like an escapee from *Melrose Place* under bedsheets. A beautiful brunette in a plaid miniskirt shakes him awake. And blows her lines. They reset and do it again. And again. And again. Each time the moves are subtly different. Until it's perfect.

There's not an artificial light in sight. The entire set is being lit from the outside. The man behind the camera, I'm told, is Calvin Kennedy, whose Hollywood credits include *Dances With Wolves* and *Waterworld*. He explains that they're shooting for three different aspect ratios: 2:1, 1.85:1, and 4:3, which creates unusual challenges in getting each scene framed so it will look good in each format.

The guy holding the boom mike over J. Michael Esposito and Marie Caldere is Bud Moffett. He's got a similarly stellar laundry list of accomplishments. Everyone is as nice as can be. No Hollywood attitude. No bloated egos. It's obvious they're having fun.

And this is Southern Oregon?

Tender Loving Care is Trilobyte's latest foray in interactive storytelling. Co-producer Howard Schreiber tells me there's "a strong possibility that *TLC* will be released as a linear film." It will also come out on CD-ROM. It is not a game. It's an interactive entertainment piece aimed at grownups. They're serious. The set's going to be closed later on because they're going to shoot a love scene.

The plot to *TLC* goes something like this: A

young couple loses their baby in a car accident. The wife, played by Marie, is having a hard time coping with the loss. She's in denial. Her husband hires a live-in nurse, played by Beth Tegarden, who happens to be a blond bombshell. A love triangle develops. You can guess the rest.

Creepy coincidence: The house *TLC* is being filmed at was put up for sale by a couple who lost their child in a car accident. The crew did not know this before it was selected as the location. It was vacant for a year. Everything in it, furniture, paintings, floor coverings, was put there by the art director, Ken Nash. The house sold the week the Trilobyte crew was ready to start shooting. Luckily the new owners have been understanding.

On the second morning of my visit the set is buzzing with excitement. No one will say it for sure, but my hosts at the bed and breakfast got the message loud and clear. They've been asked to reserve a room for actor John Hurt, which has to mean he's signed on to star as the psychologist in *TLC*.

Director David Wheeler is a man who knows what he wants, though like everyone else on the set, he's nice. No ego. No attitude. Like Jane Le

Fevre, he rides a Harley. He directed the video for *11th Hour* to, as Rob Landeros puts it, "pass the time between real projects." He helped flesh out the story to *Clandestiny*. His script for *TLC* has led him away from Hollywood to Southern Oregon and Trilobyte.

Wheeler: *TLC* is truly an interactive film production. *7th Guest* had some story being told with live actors behind the whole thing. I wasn't involved in *7th Guest* at all, I joined with *11th Hour*. The whole concept was to upgrade the story, the film concept, the acting . . . so the *11th Hour* has a more complete script. The big difference between *T7G* and *11H*, aside from the astounding technological difference, is the story. The puzzles are similar to *The 7th Guest*, but the involvement in the story will be much greater.

Clandestiny is similar to *11th Hour* in that way. We went from something under 30 minutes of video in *7th Guest* to 70 minutes of story in *11th Hour*.

In *7th Guest* if you went into a particular room and saw the dramatic mask, you'd see something take place. It was all shot very crudely on blue-

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screen. It was fairly difficult to composite all that stuff. Only 20% of *11th Hour* is composited. For game play as it relates to the story when you go into a room, nothing is triggered — the cursor doesn't turn into a mask that you have to click to get to the drama. You solve a puzzle that opens objects for a treasure hunt. You click on the right object and it will immediately trigger a scene. They're related, so if you go into the bathroom and find a puzzle on the drain, click on the drain, you see a beautiful Trilobyte thing of spiders on a web. Once that's solved, the objects come alive. Among the objects is a straight razor. You click on it and see a scene that involves a straight razor. Then you're back into the bathroom again.

You work your way toward the end of the module and then replay all those clips of everything that was missing, and the story starts to unfold. We'll run several minutes of story at a time.

11th Hour led to *Tender Loving Care*. It will have probably a couple of hours of film. And the entire game is based on the story.

So like Clandestiny, *is the player along for the ride in* TLC, *watching from a third person POV?*

Yes. Even more so here. You're more like a reader of a novel. My friends from Hollywood always say, "You guys are the next thing. You're going to threaten our business!" Most of the time I just say, "Oh, no no. This is a totally different thing." Because movies are movies and games are games. But this one could turn out to be a threat. The movie is a major production that will be finished at the same time as the game.

What the game offers is a deeper experience of the movie. Rather than playing an interactive decision making, puzzle solving thing, you watch several minutes of film and find yourself in the same environment. We're approaching it from a different angle. We're doing a photographic 3D rendition of the house. The house we're shooting in will be recreated in 3D.

So, for instance, maybe a scene ends in the upstairs hallway. There will be some kind of transition, but you're still in the hallway and you can move, go into a room, encounter one of the characters from the story who are now composited into the 3D modeled house. The character will confront you directly, so you can discover more about the characters — what they're thinking, you'll read their diaries, you'll find out things they wouldn't like you to know. . . . It's more like a novel. It goes very deep.

Sometimes we call it a hypermovie, but it's a psychological thriller. The main story is about someone who's living in extreme denial. Her child has died and she refuses to accept that and fosters the illusion that the child is still alive. So if you find a magazine, a psychological maga-

zine, you click on it and find there's a whole essay on denial along with a psychological test that you can take.

Then there's the possibility that the third character is very dangerous. It looks like there's going to be a confrontation between the nurse and the husband. If you look hard enough you'll find stories on women who kill men.

The nurse seems to have unusual techniques, and if you look in her handbag, you'll find letters from a former patient, so we're hoping to create a very deep, rich experience with everything a movie has, plus all that we can offer through interactivity.

So it's a movie with extended voyeurism.

Yeah, it is. People are always seeing movies and saying, "Well, it wasn't as good as the book." We're trying to make a movie that will be as good as the book.

When players encounters characters, how will they interact? Will there be any mechanism for dialog?

The characters address the player directly. There is a psychiatrist in the story who is the interactive thread. After you've seen a segment of story, he appears and talks about what you've just seen. But he's not just a Rod Serling type, because he's in the story himself. He's involved with the characters, and he gets quite angry with what he's just seen. Or after you've viewed a scene he was in he'll say, "I handled that rather well, don't you think?"

But no, you do not get to . . . I don't want to speak for everyone at Trilobyte, but we don't re-

ally approach interactivity from a point of "You see a character going down the hall; does he go left or does he go right?" That's not our idea of interactivity. We're trying to make how you react to what you're seeing affect what you're seeing as opposed to physically clicking on something. "Oh, I think I'll go in the the library now." Click. That's interesting, but it's being explored more by other developers.

Jane Le Fevre: We have a phrase at Trilobyte that David authored: Content drives technology. The goal is to keep the technology as seamless as possible so the consumer doesn't get put off by it. So we're relying on David for his engaging story line. The content pushes everything through.

Wheeler: All of the projects are very much a collaboration. At the same time, they're very much "this is your thing." Aside from the superstructure at Trilobyte that allows all this to happen, basically I'm the story person. And Rob does brilliant interactive design. That's his concept. Graeme's field is technology, and it's the world's best technology.

There's not much I can do about the technology other than push it by presenting stuff we haven't seen before. But as much as Graeme is a programmer, he's a creative designer. We all kind of interweave this whole thing, which gets back to this idea of unified concept.

I don't claim to be a game designer, but I'm very involved with Graeme and Rob on the design of the game. And they don't claim to be film directors. It works extremely well.

Lighting the farmhouse in Central Point, Oregon, site of the 28-day shoot of *TLC*. Shooting went on long into the night, but the lighting rigs (all positioned on the outside of the house as seen here) supplied a golden sunlight — a look that was inspired by Vermeer paintings.

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1 Do you develop or manage the development of multimedia products/services?

1 ❏ Yes   2 ❏ No

2 What is your organization's primary business activity? (check only one)

01 ❏ Media (Broadcast, Cable, Film, Publishing, Music)
02 ❏ Digital Entertainment (Cartridge/PC/Arcade Games, Location-based)
03 ❏ Advertising/Marketing/Public Relations/Communications
04 ❏ Education/Training
05 ❏ Multimedia Development/Production
06 ❏ Graphic Design/Art/Photo/Service Bureau
07 ❏ Audio Recording/Engineering
08 ❏ Online Service Provider (Networking, Content, Software)
09 ❏ Multimedia Dealer/Retailer/Distributor/VAR/VAD
10 ❏ Computer/Peripherals Manufacturing
11 ❏ Manufacturing/Process Industry (Non-computers/peripherals)
12 ❏ Computer Software/Tool Development
13 ❏ Research & Development
14 ❏ Government/Military
15 ❏ Professional Services Company (Finance, Legal, Health Care, Real Estate)
19 ❏ Other (please specify)_____

3 What term best describes your function? (check only one)

20 ❏ Executive Producer/Director
21 ❏ Creative/Art Management
22 ❏ Video/Film Director
23 ❏ Animation Design
24 ❏ Software Developer/Engineer
25 ❏ Script Writer/Editor
26 ❏ Designer (Interface, Screen, Graphics, Illustration)
34 ❏ Music/Audio Production (Musician, Composer, Engineer, Producer)
27 ❏ Educator/Training Specialist
28 ❏ Production Management
29 ❏ Post Production
30 ❏ Executive Management
31 ❏ Sales/Marketing Management
32 ❏ Information Technology Management
33 ❏ Consultant
39 ❏ Other (please specify)_____

4 What types of products/services does your firm develop? (check all that apply)

01 ❏ Entertainment (Games)
02 ❏ Entertainment (Non-Games)
03 ❏ Interactive Marketing
04 ❏ Interactive Training
05 ❏ Interactive Education
06 ❏ Interactive Sales/Presentations
07 ❏ Interactive Shopping
08 ❏ Information-based (Publications, News Services, Public Service, etc.)
09 ❏ Other (please specify)_____
29 ❏ None of the above

5 How many multimedia products/services does your firm develop annually? (check all that apply)

	Titles	Services	Presentations	Other
More than 100	01 ❏	06 ❏	11 ❏	16 ❏
26 to 100	02 ❏	07 ❏	12 ❏	17 ❏
11 to 25	03 ❏	08 ❏	13 ❏	18 ❏
1 to 10	04 ❏	09 ❏	14 ❏	19 ❏
None	05 ❏	10 ❏	15 ❏	20 ❏

29 ❏ None of the above

6 For which platforms/environments does your firm develop? (check all that apply)

01 ❏ CD-ROM
02 ❏ CD-I
03 ❏ Commercial Online Services
04 ❏ Internet/World Wide Web
05 ❏ 8 to 64-bit Game Players
06 ❏ Arcade-based Games
07 ❏ Location-based Entertainment
08 ❏ Kiosks
09 ❏ Motion Pictures
10 ❏ Cable/Broadcast Television
11 ❏ DOS
12 ❏ Windows
13 ❏ Macintosh
14 ❏ OS/2
15 ❏ UNIX
16 ❏ Other (please specify)_____
29 ❏ None of the above

7 Which hardware products do you specify, authorize, or recommend for purchase? (check all that apply)

20 ❏ PC-compatible Desktops
21 ❏ Macintosh Desktops
22 ❏ Workstations (SGI, SUN, DEC, HP, IBM)
23 ❏ LCD Projection Panels
24 ❏ Audio/MIDI Boards
25 ❏ Graphic Accelerators
26 ❏ Compression/Decompression
27 ❏ Compact Disc Recorders
28 ❏ Printers
29 ❏ Video/Film Post Production Equipment
30 ❏ PC-compatible Laptops
31 ❏ Macintosh Laptops
32 ❏ Monitors
33 ❏ Storage Devices (Optical, Hard Drive, Tape Drive)
34 ❏ Video Capture/Playback
35 ❏ Compact Disc Players
36 ❏ Scanners
37 ❏ Audio Recording/Engineering Equipment
38 ❏ Other Peripherals
39 ❏ Other (please specify)_____
59 ❏ None of the above

8 Which software products do you specify, authorize, or recommend for purchase? (check all that apply)

51 ❏ Internet Server/Browsers
52 ❏ Sound Editing
53 ❏ Animation
54 ❏ Image Manipulation/Photo Enhancement
55 ❏ Presentation
56 ❏ Search/Retrieval
57 ❏ Archival Media (Images, Sound, Animation, Film, Text)
58 ❏ Authoring Tools
59 ❏ Video Editing
60 ❏ 2D/3D Rendering/Modeling
61 ❏ Draw/Paint Tools
62 ❏ Formatting/Mastering
63 ❏ Programming Languages
64 ❏ Other (please specify)_____
79 ❏ None of the above

9 What is your firm's total annual budget for multimedia-related hardware/software purchases? (check one from each column)

	H/W & Peripherals	S/W
Over 1 Million	01 ❏	10 ❏
$500,000 - $999,999	02 ❏	11 ❏
$250,000 - $499,999	03 ❏	12 ❏
$100,000 - $249,999	04 ❏	13 ❏
$50,000 - $99,999	05 ❏	14 ❏
$25,000 - $49,999	06 ❏	15 ❏
$10,000 - $24,999	07 ❏	16 ❏
$5,000 - $9,999	08 ❏	17 ❏
Less than $5,000	09 ❏	18 ❏

10 How many people are employed in your entire firm, including all branches, subsidiaries, and locations? (check only one)

1 ❏ 1,000 or more
2 ❏ 500-999
3 ❏ 100-499
4 ❏ 25-99
5 ❏ Less than 25

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The 7th Guest *started with a detailed design document. Do you prefer to work that way on your projects?*

My experience has been *11th Hour, Dog Eat Dog, Clandestiny,* and *Tender Loving Care.* The design of *11th Hour* was all Rob and Graeme. I went out and shot that for them. Because of my lack of knowledge of the technology and interactivity in general, I came up with a lot of things that no one was expecting. I thought, "What if we just do this. . . ." and it worked. But the design document — I never even saw one.

In *Clandestiny* it was a little different. The company has grown. There were a lot of people involved. Graeme came up with the concept and put forth a design document of sorts. He had an idea that he put down on paper. Basically, I took that idea and worked with some writers to develop a story. We figured out the interface together. It was much more of a collaborative effort.

TLC started with a script. I wrote it originally to be a movie. I had a deal to do the movie before I finished the script. As so often happens in films, my financial partners dropped out. Trilobyte had finished *11th Hour* and Rob had read the script. He started thinking in terms of interactivity, just as I had been thinking of interactivity. And back in April, he and I went away for four days and did nothing but drink several hundred coffees and talk about this thing.

I have to say, Rob's been doing this for a very long time and his ideas about interactivity are way beyond anyone else's that I know. I had this concept of the environment being the same as the film environment and being able to go back and forth between the two. I thought, this being a psychological drama, we'd have a bunch of psychological puzzles and games. Rob sprang "why don't we do it with no puzzles, no games" on me. That was really appealing.

The way it works is like biofeedback. You go through this experience and you don't know what you're doing. But the computer is logging what you're doing, how you've responded to things.

So it's learning about you.

Creating a psychological profile of you. That's Rob's idea. So out of that session, he went off and wrote the document. Our team grew. We brought in four more writers — there was an awful lot of material to be written for the diaries and stuff. Our first art person, Ken Nash, is now the production designer on *TLC.* I guess a couple months later we went for another motorcycle trip and came up with the concept of the doctor who's taking you through all the interactivity. So, yeah, we do have design documents. The very final stages of that document are being done right now as we're shooting film.

It's extremely well planned. We suffer from the problem that runs throughout the industry — tardiness. Product not shipping on time. We are determined to not let that happen on this project. The script is the basis for the whole interactivity. We're using it to set place holders in

the program, so when the movie is done, we can just drop in the scenes where they're supposed to go. So we have an ambitious goal of one year from concept to availability.

Virtually every developer we talk to is trying to get their development times down, typically from two years to six months.

We'll never do a six-month project. A year, we can do. We're planning to ship *TLC* in Q4 of '96. I think it'll work, because our technology is far enough ahead that it'll last for a while. We'll apply it to the next couple of projects, so the technology is frozen.

When you get to wander around the scenes, will they be 3D modeled or QuickTime VR/Surround Video?

We're shooting everything with a 360° camera, putting some interactive move every 90°, so there's going to be something you can do everywhere in the house. And we can always put in objects through 3D Studio as well.

The way it will work is, you find a psychology magazine, click on it, the page turns, and up will come a photograph of a woman's face. And you suddenly hear the psychiatrist's voice, "We'd like to play a little game. Would you answer some questions about this woman. Is this woman happy or sad?" You click SAD. "Why is she sad? Is she having financial problems or marital problems?" You click MARITAL PROBLEMS. "Interesting. Is she having those problems because she's having trouble with her husband or because she was abused as a child?" CHILD. "Who did this terrible thing? Was it a family member or a teacher?"

And so on. It gets to a point where he says "thank you very much, that's all for now" and you move on. And the computer is taking note of everything you're saying.

There are 15 interactive episodes. If you're reading someone's diary entry — the diaries get updated after every episode — you'll be able to read about what just happened. You've seen it yourself, but you'll hear three different characters' versions of the same scene. They all have their own agenda, so it starts to influence how you feel about it. And we do what we call exit polling. "Did you think the nurse was inappropriately dressed, kind of glamorous looking for a nurse?" You might say, "No, she looked fine to me."

I'm sure other people are thinking about this, but I don't have a gaming background at all. I would like to create interactive entertainment that's not just aimed at the group we know plays games. When *7th Guest* came out, there were three million CD-ROM drives. It sold well over a million copies. That's pretty deep penetration. Now there's something like 23 million drives, but disc sales are still topping out at the same numbers.

We know that four or five hundred thousand hardcore people are going to buy our stuff no matter what, because our stuff is top of the line. We won't forget them, but there's a whole world out there that could really appreciate things. When you're talking about something like *Tender Loving Care*, where you don't have to shoot anything or solve a puzzle or do anything, you just follow the story. It never lets you down. It's not boring. It's engaging. Usually, when I describe

J. Michael Esposito as Michael and Marie Caldere as Allison, the husband and wife who, after losing their child in a horrible accident, hire a nurse (played by Beth Tegarden) and a shrink (played by John Hurt) in *Tender Loving Care,* an interactive drama in which the outcome is determined by the player's psychological profile.

INSIDE TRILOBYTE

this project to people who have nothing to do with our business, the women say, "Oh. This sounds like something that's not just for guys!"

It makes me think of the merchandise related to Twin Peaks — *Laura Palmer's diary. If you were into that show, you bought it and it took you deeper into what was going on in the show. You've taken that concept and built it into the movie. That's much more interesting than the idea that interactive film should be "Now Arnold does or doesn't shoot the guy."*

I think the Sony Interactive theater stuff has lots of potential to be lots of fun. I've heard that people like watching in groups. They start shouting at each other regarding what decision to make. A director friend just did *The Bomb Meister*, which was written by Matthew Costello who did *The 7th Guest* for us. So that stuff sounds good. But I don't think *Tender Loving Care* would work in a mass audience situation. It's too thoughtful for that.

It would be like watching Philadelphia *and having the group choose whether Tom Hanks lives or dies in the end.*

Yeah. In this particular story we have four different endings. But you don't choose. You don't consciously choose. The ending will be provided depending on what you've done. And throughout the story segments, there are alternate scenes and they're not like a branching story. They're weighted towards which of the characters is right and which is wrong. It's more bulging than branching.

The husband starts to conflict with the nurse over the treatment of the wife. The basic story line is that the wife becomes a victim in the war between the husband and the nurse. As the layers are peeled away you start to think that this therapist is really nuts. But on the other hand, she makes so much sense, maybe she isn't. You start to think, "Gee, the husband is sicker than the wife. Maybe the wife isn't as out of it as we think." And so the scenes will vary that way. You start taking sides.

It should be fun. It reads well. Before we started shooting, we did a read through. The various scenes really made a difference. They're subtle. But not so subtle that you don't notice. They actually create major changes in attitude. For the most part they're not so different that you'd say it's a totally different movie this way.

Did you ever see *Rachomon*? It's a movie made in the '50s by Akira Kurosawa. It was a story of an attack on a country road. Someone's on trial. The same story is told several different times. Each witness offers a different interpretation, so *Rachomon* influenced us quite a bit.

What sort of challenges has this presented

for the actors and actresses?

Nothing other than the usual, because basically it's all story oriented. They're not having to do anything out of the ordinary. We will have a couple of days of bluescreen work. Actually greenscreen. And that will be different. I don't know if any of our people have done that before. They'll adapt. Actors and actresses are some of the most adaptable people you can find anywhere. You can stick them in any situation. We took people out of the Shakespeare Festival and put them in front of a bluescreen for *11th Hour*.

This one is so story oriented that they're just there. They're doing variations on scenes, but they're not having to do incredibly repetitive stuff that you might associate with interactive acting.
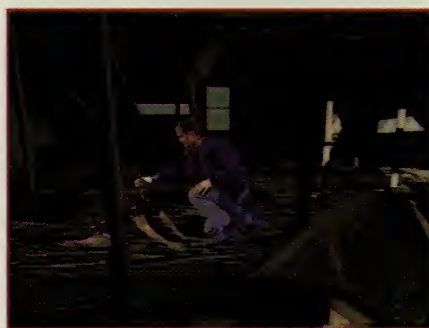
Before: Actor Doug Okeefe against a bluescreen. After: Carl Denning in the attic of the Stauf Mansion courtesy of video compositing technology.

They don't have to walk up, down, and across stairs from different points of view. We were just looking at *Fantasmagoria*, where they had to do that because you have to cover everything. Not only do you have to film walking from the bathroom to the bedroom, you have to go back again, because the player might decide to do that.

Duty calls. As Wheeler leaves to continue his 12-hour plus day — the crew shoots long into the night, but the lighting system presents the illusion that it's broad daylight in the house when in reality it's after midnight — co-producer Howard Schreiber takes a seat and continues describing *TLC* from his point of view.

Shreiber: I keep learning more things about interactivity, especially with *Tender Loving Care,*

because it's different from anything we've done. We're constantly revising the script as we're going along. We've gone from a 120-page script to close to 200 pages now. That extra 80 pages is exclusive of the interactive material we'll add later.

There's such a wealth of material that keeps growing as we're shooting. It's one of the things I'm being called to task for by management, but I don't think there's a real clear understanding of how much material we're adding. Every day we're saying we need to add an additional stream. It's going to make it tremendously interactive.

From a producer's standpoint, it's always a balancing act. On a normal film, you're faced with quality versus budgetary constraints. Everyone here is trying to make the best film they've ever made. One of the things that's great is that Southern Oregon is a growing film community. We're just starting to get on the edge of feature filmmaking. Everyone is giving 120%. This is everyone's masterpiece.

My function is to keep that masterpiece up and keep costs down. From a film standpoint, that's a struggle. When you add interactivity, you add the question how cutting edge can you make it. That's another budgetary balance I have to deal with. So far, I've been opting for the creative, totally artistic masterpiece. It's been great. I'm a little over budget.

You're shooting in three different formats. Why?

Our hallmark is 2:1 screen aspect ratio, so we have to frame for that. For theatrical release, you're framing at 1.85:1. And then you've got to consider the television market, which is a 4:3 ratio. Framing is very difficult when you're dealing with all three and trying to maintain the artistic look throughout.

Then we've got our greenscreen consideration. *TLC* does not have as much greenscreen as our other projects. We're only going to be shooting for two days. In most cases, you know that if there's any green on anyone, it's going to disappear. But here the same people playing in the house have to shoot on greenscreen. Anyone with green eyes could end up eyeless. But we can pretty much dial that out. Our technology is such that we have great control over specific parts of the frame.

We're shooting in 35mm, where *7th Guest* was shot in S-VHS, *11th Hour* was shot in Beta SP, *Dog Eat Dog* was done with Digital Betacam, and now we're using 35mm film. We're constantly trying to up our production quality, which is another reason our budgets keep getting bigger.

Our resolution is going to be phenomenal, because you're talking about 2,000 lines of resolution on film compared to about 1,000 lines for Digital Betacam. We're shooting stills with a 360° camera. So the whole interactive side might look completely different. 3D Studio may still get in there somewhere though.   ❦

THE BUSINESS SIDE
COO KELLYN BEECK ON GROWTH,
DISTRIBUTION, AND WHERE THE MONEY COMES FROM

Executive VP and COO Kellyn Beeck has been making computer games for years. He has known Graeme Devine and Rob Landeros since the '80s when they collaborated on projects for Cineware. Beeck was running a software firm in Portland when he decided to take time out to go to the Shakespeare Festival in Ashland, Oregon. While there, he stopped by to see how Trilobyte was doing. To his surprise, they'd grow from five or six guys in one room above a tavern into a company with big offices. *7th Guest* had just come out and investors had put a lot of money into the company. Devine and Landeros had big growth plans and were looking for people to help them manage that growth.

We caught up with Kellyn on the *TLC* set.

Could you talk a bit about your strategy for growth?

We're a creative studio. That's what we always want to be, it's what we've always been. We don't see that ever changing. It started as a family unit with Rob and Graeme and a couple of other people. It's always had that feel, even though we've grown a lot. We've got several of these huge projects under development, we're doing these major Hollywood style film shoots and Kevin Costner's cameraman is here, and it's still just a little family company.

We do plan to grow, but no more than feels comfortable. We don't plan to become a major corporation.

How are you going to avoid doing that? I mean, you're up to 43 employees.

Yeah, 40-plus people and we're starting our own publishing venture. Our products are going to be distributed by Virgin, so we're doing marketing and other things we haven't done in the past. Bringing in people in those areas, so we're growing and adding new people in the next year or two. But it's not going to be a large amount of growth.

Are you a Virgin affiliate label now?

Right, it's an affiliate label-style deal.

How do you draw the line as to when to bring functions inhouse and when to farm them out? For example, Rob Stein was talking about wanting to bring a motion capture system inhouse.

Got a coin? No, it's usually a matter of trying things out. Sometimes we'll try them out internally, and sometimes we'll try them externally. Whenever it becomes a true core of the projects we do on an ongoing basis, we like to become experts at it and bring it inhouse.

That's why we have a film unit. David Wheeler and Howard Schreiber are on staff, a permanent part of Trilobyte. A lot of multimedia companies use independent filmmakers. We're very committed to that part of our productions. Whenever an element becomes such a big a piece of the puzzle, we try to do it internally.

We did animation for *Clandestiny* in Taiwan, so we work both ways. It takes a lot to build a large animation shop. In taking that project on, we were doing a lot of cel animation, and for us to build an animation studio like that and do it well would be an enormous undertaking. So we went to Taiwan and that's worked out extremely well.

How much of your budget comes from investors and how much is seed money from Virgin?

Where's the money come from? Trilobyte is very fortunate because we've been so successful. Since *The 7th Guest* was a hit and *11th Hour* is an apparent hit again, the company has been pretty financially independent. We have investment partners. Revenues from existing products are part of the picture. So we haven't had any problem on the financial side. I don't know if that answers your question, but I'm not at liberty to discuss numbers and budgets and so forth. Trilobyte is in a very stable position because we started out with a hit product. It's a nice place to be.

I guess for a multimedia company, we're almost approaching middle age. It's a five-year-old company. Certainly, we're a mature company.

Does Virgin handle all your distribution worldwide?

Yeah. Worldwide. We're discussing future products. We are committed with them for domestic distribution for a specific number of upcoming titles. They've been a good partner on one, soon to be two, successful products. It's hard to argue with success. They're a good distributor.

You've got a lot of projects going simultaneously. How much of a balancing act has that been?

As a company we've had to adjust and come to grips with the fact when you're not doing one product at a time, you have to divide your focus a little bit. We've been a multi-product company since I've been here. Pretty soon after *11th Hour* got underway we launched into other projects. Because so much goes into a large multimedia title, there's a lot of time in the development process — developing the concept and the creative and the script and the production plan. To the rest of the world we probably seem like a one product at a time company, but we've been developing multiple products for two years. We've long since made that transition ourselves. It was mostly mental. Instead of being able to devote yourself to one thing, you do multiple things and build a group of people, producers, designers, programmers, and artists who can help realize that goal.

You've also got the technological infrastructure in place already.

Right. We're using the same technology to support all the products. That helps reduce the amount of time it takes to get these things done. It's been about two and a half years for both *7th Guest* and *11th Hour*.

So are you taking bets as to whether Tender

The first time the characters see the castle in *Clandestiny*, you see it from the POV of the man who wears glasses. The glasses are off, so the image appears out of focus. As he lifts his glasses, you see the castle clearly in the lenses of the glasses. The effect was created by making an in-focus version of the castle that follows the frame of the glasses. The castle was made out-of-focus with a blur filter.

INSIDE TRILOBYTE

Loving Care *will be done in the year that everyone is talking about?*

We have a couple of products that are ahead of *TLC* in the production cycle with the same kind of schedule, and they're on schedule. So early indications are good.

When's **Clandestiny** *due to be released?*
We haven't announced a date.

I was surprised to see how adult the content of TLC *is. I mean, the set is closed today because they're shooting a love scene.*

Yeah, I think this is a very exciting project that will open some new paths for interactive drama. I think you'll start to see a lot more true adult dramas in interactive because there's a trend throughout the industry. People have wanted to bring dramatic values to interactive entertainment, but it's been difficult because of technical limitations and the evolution of designs. Now we're finding we have the ability. We've spent a lot of time thinking about how to do it. We're very excited about the ways we're incorporating dramatic elements into our products.　👁

INTERACTIVE STORYTELLERS
ROB LANDEROS AND GRAEME DEVINE

At every interview I conducted with Trilobyte staffers, I sensed a respect bordering on hero worship for co-founders Rob Landeros and Graeme Devine. Both are storytellers first and foremost. All the technology and all the technique are there so they can tell their stories. They've fostered an enthusiasm for creative collaboration within their company that everyone seems to share. As fate would have it, theirs are the last two brains I get to pick on my visit. I've already gotten the answers to most of my questions, so I decide to ask some of them again, just to see if the gurus could shed a different light on the answers.

This session starts one-on-one in Rob's dimly lit office. Landeros is extremely soft spoken, his voice is barely audible above the whir of the fan in his computer's hard drive. Devine wanders in from an engineering meeting midway into the discussion.

Landeros: I guess we're on the verge of busting out. People are going to be able to see that we're not just a one-product company. There's a lot happening here. We're not just *The 7th Guest* people. We had our flash. Then *Myst* came along and people sort of forgot about us. So we're ready to re-emerge.

Trilobyte president Rob Landeros wanted to pursue the idea of telling a linear story with added interactivity. As he puts it, "We've started calling them hyperactive movies. Instead of taking a linear story and breaking it up, you're enhancing it in various ways. But there is some subtle branching and arcing that changes the way you interpret stuff."

Trilobyte CEO and technical wizard Graeme Devine on his GROOVIE technology: "We had a need for tools to perform interactivity. There's no equivalent of the word processor for the interactive newsroom. How do you write an interactive script? You've got large asset systems for these large projects and there's nothing out there that can handle it. You know, Word for Windows Special Multimedia Edition — it doesn't exist yet."

I was surprised to see all the projects you have in the works, especially TLC.

I've kind of adopted that as my own. I wanted to pursue the idea of telling a linear story — it doesn't have to be branching all over the place — and add some interactivity. At least one form of the so-called interactive movie. I like to stay away from that term. We've started calling them hyperactive movies. Instead of taking a linear story and breaking it up, you're enhancing it in various ways. But there is some subtle branching and arcing that changes the way you interpret stuff. Shoot certain scenes different ways. Make certain cuts. Little subtle differences you may not even realize are there at first. Then find out they matter.

You know, it's such a powerful medium. Take the idea of laser disc-style supplemental material where they include outtakes, scenes that were cut, being able to program the disc player so you can see it the way the director originally wanted. It's fascinating that a movie doesn't necessarily have to be what you see in the theater. That's one version, but there's probably any number of versions that the director can come up with. And even when people do go see one version, they come up with different interpretations. This medium gives you the opportunity to have different players see different variations on the story.

So the experience is different for each player based on the choices they make.

It's not even choices, really. It's more a subconscious following of your personality.

Could you describe how the game keeps tabs on what you do?

It's going to run some psychological tests on you. It'll ask you all kinds of questions about a situation. The film has 15 episodes and there will be breaks and you'll get the opportunity to take tests. It'll ask how you feel about the scene

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and we'll get direct response back. And that all adds up to an adult personality profile that will skew the how the movie plays.

The idea came about in a discussion with some friends. We were talking about the Sony theaters. I thought, it's kind of interesting but it's still a collective experience. The audience is sort of a collective consciousness. Most entertainments don't vary presentation except in certain live performances that vary for each audience by changing material a little bit. I thought it would be interesting if you were in a movie and connected to electrodes and things that would measure your responses and could automatically and transparently gauge your reaction and make the movie accordingly. That idea evolved into doing something like *TLC*.

We were debating whether we should print out some kind of analysis at the end, so people could see why they got *that* ending [*laughs*]. The story has some pretty powerful conclusions.

We'll see if that's what interactivity and interactive storytelling are all about. One thing I tried to do was eliminate the game altogether. Just toss game out of this completely. Most interactive movies are game oriented. I thought it would be interesting to do some lighthearted comedy or a serious drama.

We're trying to do stuff that's unique, that hasn't been done before. If it has, we're not going to do it. One thing we don't do is licensed titles. We've certainly had a lot of that stuff thrown our way. It' been hard to turn some of it down. It's hard to say you don't want to do the next *Star Trek* disc. But again, if it already exists or someone else owns it, we're not going to touch it.

You're going after a more adult audience with TLC.

It should be mainstream USA. Not to be confused with family entertainment. The mainstream that liked *Basic Instinct*. Half that market has been ignored for a long time. The hardcore gamers hope they keep making shoot 'em up games and their multimedia CD-ROM products. If you're going to be involved in storytelling, you may as well try to get away from another *Star Wars* license or *Dungeons & Dragons* stuff. That's a large market. You can depend on those people to buy product, but I want to expand the market.

There really hasn't been anything targeted toward the more serious adult market in this medium.

It's risky. If I didn't own a big chunk of this company, *TLC* wouldn't have gotten approved. Any other publisher giving this project a green light would've asked where's the game? It's drama? You mean it's not interactive? It's linear? Where's the branching?

Plus it's not easy to do. To make a really good

story that's not embarrassing. Hollywood's hits are few and far between. Most of the stuff that comes out of the studios is crap that ends up on cable and in video stores. So you can't blame too many people for not approaching a serious movie-like product. The production's not there. The talent's not there.

We've got some talented people. Graeme and myself know how to tell stories and design technology. David Wheeler knows how to write scripts and direct. I think there's something magical about that. The technology is still a huge part of this, but movie making and telling stories have been around for so long. The techniques are out there. People know how to do it. What you need are people and supplies and financial backing and some belief in the project. I'm still kind of surprised that Trilobyte gets to do this kind of project. Nevertheless, it wasn't one of those things where people said, "Oh, yeah, that's great."

It was one of those things you say, "What should we do? *7th Guest Part 3?* Yeah. That's a no-brainer." There's still some doubt about *TLC*, it's not something that's been proven before. I hope it works out.

I would imagine you got the same kind of reaction when you first approached Virgin with the idea for The 7th Guest.

You know we tell the story quite a bit of how Graeme and I spent a couple months writing the design doc. Martin Alper from Virgin took us out to lunch and told us our future wasn't with Virgin. We should go do our game — here's a contract. I guess on general principle he didn't want to turn down the project, but at the same time a lot of people at Virgin didn't get it. I think for about a year there were some guys in the testing department who'd come by and tell us we were so cool. But there was a lot more scratching of heads.

GROOVIE Technology
Clandestiny Lead Scripter Craig Peterson on Working with Trilobyte's Proprietary Authoring System

I've been working on *Clandestiny* since April or May of '95. By the time I see a puzzle design it's been pretty well laid out. When I first get the design, I meet with the artist. We sit down with the spec and figure out what's going to be needed as far as assets go. It's easy to get off track if I think one way and the artist thinks another. We try to get together early in the process and figure out something that's going to work. Usually the scripting process is pretty quick. The logic of most of the puzzles, even the ones that are tough to solve, is fairly simple.

There are a lot of parts to the software business where they talk about specing things down to the 'T.' Approaching it as an engineering discipline. At Trilobyte, they're intentionally vague, so the artists and scripters can apply creativity to the situation.

We use TIFFs as place holders. As we map the navigation, we use a place holder to mark where a 3D asset is going to get plugged in.

The player and the core graphics technology is all written in C and Assembler. The scripting is actually done in our proprietary language — GRaeme's Object-Oriented VIEwer, GROOVIE technology, which Graeme Devine has been developing for four or five years now. The compression, graphics engine, and scripting language

Trilobyte's GROOVIE scripting language is very good at mapping puzzle logic to digital assets.

all fit together very neatly. The GROOVIE language is really good for mapping puzzle logic to assets.

I've worked in a lot of different languages, so making the transition to GROOVIE was pretty straightforward. It's not a rich language in the sense of having lots of different aspects to it. I mean, modern computer languages like C++ can take years to ever use every feature. GROOVIE is adapted for one purpose, and it does it really well. It doesn't have a lot of bells and whistles attached to it. It's also flexible, so if there's something we really want, we just call up Graeme and he usually gives it to us.

I still find it incredible that one of our early indications that we were holding a tiger by the tail was that we accidentally premiered the demo at CES and got all kinds of interest. We knew were on to something, but I don't know if Virgin ever made much of that, because it didn't make any difference in the support they gave us. They didn't advertise . . . I think they ran two ads, one in *Discovery* magazine and one in *Omni*. It wasn't until they sold the first run of 80,000 units that they started to get it.

What do you think makes for compelling storytelling?

It's usually about characters. Going back to when we started Trilobyte, what we wanted to do was explore storytelling. You know, we've got large storage capacities, state-of-the-art graphics, all this music and sound, but gee, what do you do with all that stuff? In movies, you tell stories. Yeah, you can still play games, but we wanted to explore stories. *7th Guest* allowed us to lead up to some storytelling standards. We tried. And now *11th Hour* is getting there. We're telling a compelling story.

As far as the story goes, the original concept was to make it nonlinear. In my mind I was picturing puzzles where you see photographs of a room taken at various times of day that are shoved all around so you have to figure out how they fit together in chronological order by looking at shadows. We figured, it's a haunted house. Hauntings happen nonsequentially. You enter a room and you see scenes from the past played out again and again. The goal is to make sense out of all of it.

[*Graeme Devine enters.*]

I don't know who this guy is, he's an impostor.

Devine: I'm a hologram. The real Graeme is stuck in traffic.

Landeros: So as it turned out, I was disappointed to not hear as much feedback on the story from users. Most people talk or complain about the puzzles or problems with their systems [*laughs*]. We went to a lot of trouble to put those actors in there, but it's not vocalized by players. Deep down I think they appreciate it. I think the back story . . . people still talk about Stauf. He wasn't even on screen for more than half a minute or something.

Devine: Yeah. The only character they remember is Stauf.

Landeros: You just need a juicy villain talking at you.

We got onto this subject by my asking what makes for a compelling story.

Landeros: I said characters.

Devine: Closed Environment. I like the fact that in *The 7th Guest* and *11th Hour* there's no running down to the store. There's no way out except to solve the puzzles surrounding you in a small environment. That's important in games and movies. I mean, *The Shining* is a very eerie movie because there's no way out of that hotel. The same is true with *Alien*. Even *TLC* is a very
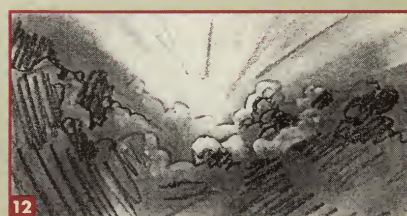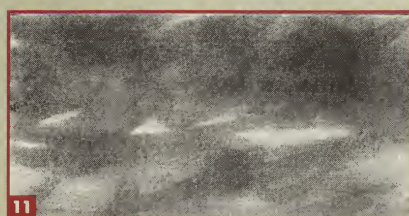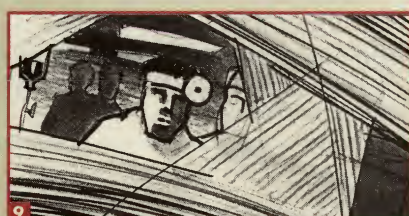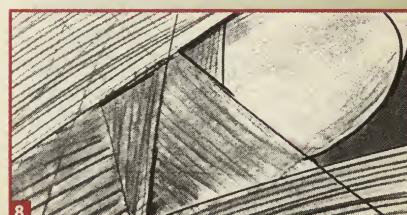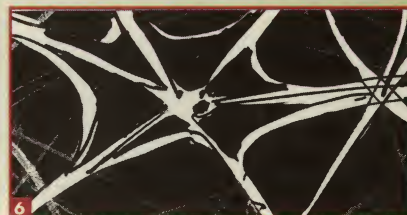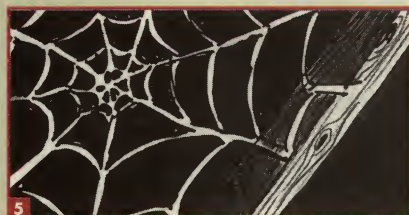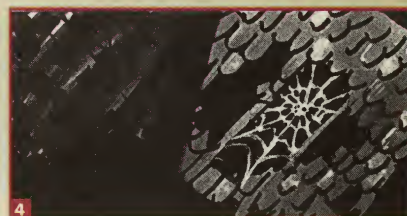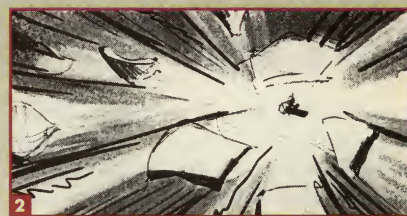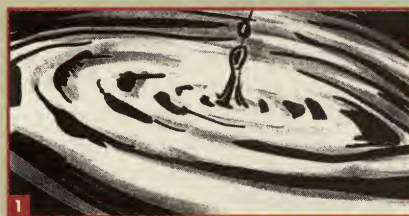
The intro that never was. Storyboards from a couple years ago illustrating a sequence designed to get the player into *The 11th Hour*. The idea was abandoned and replaced with an extended sequence involving a motorcycle ride and some backstory to establish the relationship between Carl Denning, the woman he goes searching for, and the legend of the old Stauf place.

very closed game. It's an exciting product because it's the first real product we've made since *The 7th Guest*. *11th Hour* is a sequel. It's better than *Guest*. It's the game we wanted to make when we made *7th Guest*. *TLC* is a departure.

Landeros: I wish I had a better answer to what

makes good storytelling. . . . Oh. Point of view. I think we learned a lot about point of view. Over the course of our experience with *7th Guest*—the first person thing was okay. Part of the experience was figuring out who you were. Were you a ghost? Who were you?

INSIDE TRILOBYTE

Devine: Incredibly hard to do technically as well.

Landeros: That's true. It was pretty cool. From the start to the end it was kind of seamless camera tracking. Now we've decided to move the camera. Put it in the third person. It's one of the issues you have to deal with when designing a game. What's the voice we use? Who are you identifying with? You have to make that clear so the person is not confused. Most stories have well-defined reasons to feel sympathy for the characters.

What else is there to good storytelling? Good graphics. Good music. MULTIMEDIA! [*laughter all around*]. It's all those things. I think one thing that's missing is people-oriented material. That's part of the gender thing too, as far as the killing thing goes. There's a wider audience out there. There are all those women who complain about games not being for them. What are you going to do? Not write games specifically for doctors. Write a Barbie game? Yeah, right. Women should like that. Do a soap opera thing and throw in a little romance? Gee, I'd have to really be abusive to want to do that. So what do you do? You do a thing with people and real relationships. Where they're relating interactively or do it passively where they just see two people relating. That way you can add third-party interactivity by letting people talk about what they've just seen.

Devine: I think males are used to using tools and understanding moving parts, so when it comes to games they have no problem understanding how inventory systems work or figuring out puzzles. You know, what tool do I use to get around this kind of puzzle. There's no emotional attachment other than using tools. Whereas the female or even just the mass audience will iden-tify with a story, with relationships. The tools-oriented game players.

Graeme, tell us about your proprietary tools.

Devine: They're not really all proprietary. It's just that we had a need for tools to perform interactivity. There's no equivalent of the word processor for the interactive newsroom. How do you write an interactive script? You've got large asset systems for these large projects and there's nothing out there that can handle it. You know, Word for Windows Special Multimedia Edition — it doesn't exist yet. Every other industry has those tools in place. They've had them for years. Each theater has a 35mm projector. You can take your film anywhere in the country, and it will work. You can't say that about multimedia. It'll get there and the need for tools will certainly diminish, but right now, whoever has the best tools has an edge. In fact, whoever hires more people who are good storytellers who can use those tools really has more. We have difficult technical considerations and we have to think about the content beyond.

Are you spending your time designing tools or are you getting to do storytelling?

Devine: On *11th Hour* I've spent huge amounts of my time on tools. Gosh, I can't think of when I got to work on anything but. On *11th Hour,* it's been ages. But I'll get back to that. Rob and I have a relationship where we complement each other. But *11th Hour* called for technologies that were more powerful. We both worked on the technical aspects. We both worked on the art. We played off each other well and got a stronger product because of it.

Landeros: I'm really fortunate to have these tools. It's also nice to have John Hurt in *TLC.*

Devine: One of the first questions he asked was how will I look compressed?

It's interesting that he knew to ask that question.

Devine: Yeah. How will I look compressed? Better than on video tape. I was watching dailies to *TLC* and thought, "Shoot. This stuff's, you know, cameras panning, moving around, backgrounds changing, rain coming down, it's a good thing we can do this." Because if we had old technology we'd be ruined. The whole story, the whole point would be gone.

Landeros: It would really get in the way. I don't think we would want to get involved in something like *TLC* without the technology.

Devine: The player should never notice the technology. They should never consider that it's there. The computers we have now are faster and better, but apart from the video — there are horrible problems with video — they're the best thing on the planet.

We've had a lot of people describe your video compression codec. What's it do for audio?

It can put out fairly lossless 16-bit, 20kHz stereo, but most of our stuff is still mono running at 8 bits, which clips audio quite badly. Actually, it's changing with *Clandestiny.* We're going to 44.1kHz, 16-bit stereo. The music in *11th Hour* is still played the way we played it in *The 7th Guest.* All of the sound is live in *Clandestiny* and *TLC.*

One of the things I was surprised by when reading the design doc to T7G *was the descriptions of the audio. They don't match what you hear. They're much more atmospheric.*

Devine: We really skimped out on the audio in *The 7th Guest.* We had all these plans, but we ran out of time and shipped it. Near the end, no one had the energy to do anything else. It was hard enough to get what's on that disc on that disc.

What makes for good puzzle design?

Devine: You know it when you see it. The toughest puzzle in *The 11th Hour* is actually the microscope puzzle again. That's one of the puzzles that evolved from a puzzle that didn't work at all because it was too easy. Now it's one of the best puzzles in the game. In the end it could stand alone and sell because it's so good. It's hard to describe the process.

Landeros: A lot of people ask where the puzzles come from. Most are just pencil and paper puzzles. A lot of it is just presentation. Instead of just presenting it as Xs and Os, you'll say, "a man has to cross the river and. . . ." giving you all this imagery. Then we take the circles and turn them into cue balls and instead of just racking up the cue balls into a three-by-three grid, we put them in 3D.

In the pencil version of this one puzzle, we show little lines with arrows indicating how you connect these circles. In the computer, you can take those lines out and have the cursor show you how you can go from cue ball to cue ball. So it's a matter of taking the visual presentation, matching it with the setting, factoring nine circles on a grid into a nine-ball rack, and using the computer to tell you the rules of the game.
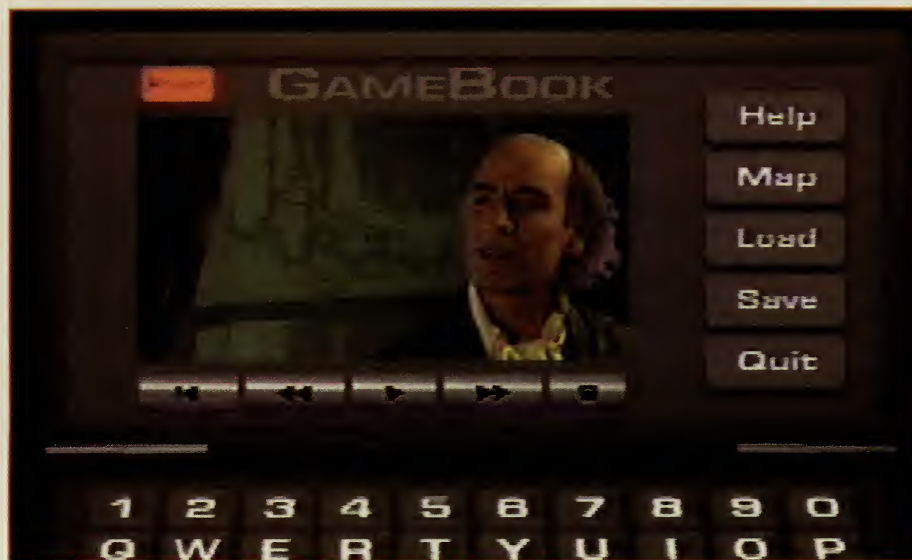
Carl Denning's PDA serves as the Game Book, which allows players of *The 11th Hour* to access video clues, ask for help solving puzzles, or check the map at anytime, immensely improving the interface from *The 7th Guest.*

There are no big fancy rules, but as you play, they become apparent.

Devine: It's amazing how easily someone can solve these puzzles when they're on paper. As soon as you stick it in 3D, they're in trouble.

Landeros: Everybody was expecting more in *7th Guest.* I remember getting into an argument with a guy who said, "All it is is a bunch of puzzles." *Hell,* what was that? It sold a lot of units. It was very popular. But it was a game. The pieces animated. Our pieces animated too. We threw 20 games into *7th Guest.* The microscope puzzle. And the guy never saw my point.

Devine: There're some games like *Myst* that are loaded with environmentally based puzzles. It works well in a closed environment. It also does well in its puzzle design. There's no inventory. It's all puzzle design on a larger scale. Using the whole island as a puzzle was very, very clever. Whereas some games, like . . . *Under A Killing Moon* that use inventory and death-based puzzles aren't quite as appealing to me but they're still popular. I like to use pencil puzzle-based games to keep a broad appeal going while telling a story.

Landeros: Yeah, puzzles that programmers think are clever pretty much stink. I was trying to figure out what programmers think about that. I check to see if a puzzle is fair, pure, there's a strategy so that if you don't win it's not because it's got an obscure solution it's because you just didn't see it.

Devine: If you look back at some of the old Infocom games, those had all sorts of involved puzzles. There was one that had two solutions to every puzzle. They also had good writers on staff using systems that were very well established. If you could graphically represent the Infocom system, I'm not sure it would work at all.

Landeros: Another thing you try to do is make sure you allow hints and a lot of help so that if you couldn't solve a puzzle, the players won't get stuck.

Devine: Yeah, people complain about that. I don't know why. "I just played the game in an hour. I didn't play any of the puzzles. I autosolved them all. I didn't get my money's worth." Well, you didn't play the puzzles.

Now you're designing games that learn about the player.

Devine: Yeah. That's the idea behind *TLC* and *Dog Eat Dog.* And that means that as they make choices and the game learns about them, there's a lot of media they won't see in the product. They'll have their own personal entertainment experience. In *TLC,* there's no question of who they are. In *Dog Eat Dog,* it's a question of who they want to be.

Landeros: A lot of that work falls on the writer, because only a couple of people on this planet have read the script for *Dog Eat Dog.* It's 2,000 pages. It's very complicated. There are even a couple gay scenes in there. But they only happen

if you keep flirting with all the guys [*laughs*].

Parents might get upset when they hear this, but hey. It's only going to happen because of the choices the player makes. It's not our fault, right?

Devine: I'm sure people will still see it as our fault. Oh well.

Landeros: Others will take the position that we have a moral responsibility to have them in there. I take the position that we aren't responsible to the outer world who can't handle "correct" forms of entertainment. I might even feel that way if we were describing linear forms of entertainment. But I think it's even more so when you're talking about interactive entertainment. You present them with all that's possible. You create this world and then let people experience it. And what you get out of it is what you put into it.

The church groups will love you guys.

Landeros: I know, but that's good publicity [*laughs*].

So, 11th Hour, 7th Guest. *Both closed environments. What about* Clandestiny?

Devine: Yep. Closed. *Clandestiny* is another puzzle-based exploratory game set in a Scottish castle. It's a continuation of the *7th Guest* kind of game. I didn't have much to do with *Clandestiny.* It was nice to be able to take people who dealt with *7th Guest* and *11th Hour* and ask them to continue on. Make it like what you've done before, but put in new twists. And that's exactly what they've done.

Landeros: You know, this is the greatest job in the world, but there's like 2% of it that's really fun.

The rest is a lot of tedious, detail work. There's hundreds of megs of assets to keep track of.

How do you track your assets?

Devine: We use this param system that stores all the parameters for every single file. It's very well structured. The database is like a tree. So for *11th Hour,* you'd have a room and any puzzle that's associated with that room and all the assets associated with that room and that puzzle — the animations, the sound effects, and it's an ongoing challenge to get that system working. It's to the point where it can handle multiple projects at once. Right now we have two projects on it, *Clandestiny* and *11th Hour,* and we're trying to work out how we're going to bring *TLC* and *Dog Eat Dog* and any more projects. Handling all those assets, not being able to deal with them, is what causes delays. Before we had the system in place it was chaos.

When we did *7th Guest,* we sat around for weeks pondering whether we could afford a two-gig hard drive. Now they come built into most computers.

What kind of a challenge has it been for the personnel here to go from being a one-product-at-a-time team to a multiple simultaneous product development team?

Landeros: It isn't as easy as it sounds to get a bunch of people together and tell them to do a *7th Guest*-type game like *Clandestiny.* You've got to learn to let go. You've got to learn to manage a big company. I mean, somebody else is hiring people? I didn't get in this business to run

NeXT Step
Greg Goodrich on Trilobyte's Operating System of Choice

Trilobyte's operating system of choice is not what you might expect. It's not Windows or DOS or Mac or Unix. It's Steve Jobs' NeXT Step. When we asked why, VP of Product Development Greg Goodrich, who had worked at NeXT prior to joining Trilobyte, shared his religious beliefs with us.

Goodrich: What NeXT Step gives us is speed. That in itself is worth its weight in gold. Mission-critical custom applications and our GROOVIE technology are competitive weapons that were created to benefit the kind of content we come up with. But the speed of development — getting to market quicker than your competitors — is the key.

But we benefit from everyone doing well in this market. We're not trying to blow anyone out of the water. We're storytellers. When *Rebel Assault* and *Fantasmagoria* came out a lot of people asked us if we were worried about them. No, we weren't. We wish them all the luck in the world. I thought it was a great story; didn't think the technology was that good.

We'll continue using NeXT Step, though we may not use native NeXT Step in the future. We may be be displaying PostScript on top of a Mach OS on top of BSD 4.4 Unix. It may be NeXT Step APIs displaying PostScript on top of HP/UX or on top of OSF1 running on Alpha servers or on Windows 95 or NT.

NeXT Step's look and feel may change. The underlying operating system is changing quite a bit, but the programmability and the affordability of the compilers, the distributed operating system, and the networking structure will stay intact and we'll continue using it unless something better comes along.

We just bought some HP 735 RISC systems running NeXT Step. They're screaming fast and screaming expensive — I think we paid 75 grand per machine. Graeme's got one at home.

INSIDE TRILOBYTE

a corporation, so one of the challenges is balancing between running a business and doing the creative things.

Kellyn Beeck told us that the goal was to balance growth and not become a giant corporation. With 40 plus employees it seems like you're well on your way to doing just that anyway. How do you limit growth?

Landeros: I don't know.

Devine: Someone asked us the same question doing *7th Guest*. We were four people then and now we're something like 42.

Landeros: Yeah, if we had $40 million sitting in our bank account or something, we'd have to spend it on something. A bigger building, more projects, more people.

Devine: I think Rob's point is that our goal is to get back to what we're good at doing — making games, not necessarily growing the corporation. A lot of the focus has been getting us back to where we can start making games again. Growing the company, hiring people. That's my immediate goal. Who knows where that's going. When you grow that fast things develop like corporate culture. Look at where Electronic Arts is. I don't know if that's really what we want. Electronic Arts is larger than . . . look at the stock, they employ more people, they have a distribution arm. I don't think we want to get into that side of the business. Rather than bring those things on, hire them out. There're a lot of elements in this business that we don't want to catch. Basically, as a business the distribution of video cassettes is similar. There are three or four major players.

Landeros: I think I've had more time to adjust to the role. It's been a couple of years since we started work on *11th Hour*. Adding *Clandestiny*, *TLC*, and *Dog Eat Dog* as we went. I've been watching the corporate culture more and more. Keeping track of what's going on. If I see something deviate I have to ask if it's what we want. I give advice on game development issues and help out with training. So I don't know, before I grow up I want to be a . . . [*laughs*].

Devine: Getting people properly trained is part of it, but we're all adults. And part of the family law at Trilobyte is getting people properly involved with the products they're creating. Common office policy is work habits, how much we get out of the company, what sorts of stock options we offer, and the Trilobyte way is to offer as many options as we can. People really enjoy working here because of that. That's a difference employees notice. People want to work here.

How likely is it that you're going to get seduced off into making movies instead of interactive products?

Landeros: I don't know. We're still experimenting. It could be one genre that we do. I think I find it comfortable working on multiple projects, something new, an interesting game or two, and I don't have to choose to do just one. We're already planning *7th Guest Part 3*. I don't know how many more products we'll be doing like that. We'll probably get tired of it after a while. Or cynical about it.

Devine: I guess we'll end up being like Wes Craven coming back to do Freddy just one more time. But we won't turn into a movie company. Most movie studios are moving towards making interactive products as well as linear movies. We're going the other way. Our stories are so compelling that they'll turn into movies in pas-

sive media. And Trilobyte will be in control of some of that.

Landeros: Our products are easy for Hollywood guys to make into movies that are interactive. You don't have to take some obscure back story and make something out of it. *TLC* is handing it to them on a plate and it's on 35mm film. There's no big stinking mystery to making a movie. You get a director, a crew, a script . . .

Devine: And a lot of money.

Landeros: Maybe we won't be making movies ourselves. Then again, maybe we'll set up a studio here in Medford. I don't know, that's pretty ambitious.

Devine: But we'll always be doing original product. We turned down *Star Trek*. That was hard. I wanted to do it. But NO! The whole idea is what properties you have. What other ideas do you have that you can't do. I'm beginning to see that.

Landeros: When Hollywood comes to you, they have all these starts already, but you have to walk away from that. We won't rely on Hollywood's licenses. The tables will be turned 180° and they'll be coming to us for the licenses.

It's interesting, because Hollywood is fairly clueless when it comes to interactive media.

Devine: What's telling is when you go to Hollywood studios and see their interactive departments. These guys know how to make movies. They know you don't send a bunch of actors off to make a movie. But their interactive division consists of three programmers and two artists. That's it. No game designers. No producers. No writers. You'd think out of every industry on the planet, the film industry would realize that, but no. They're sucked in by technology and technologists. They think technology is all you need. We'll see how that plays out.

Talk to most publishers and they're lured by Hollywood. Virgin are incredibly drawn by Hollywood. It's like they have this magic pendulum that they get hypnotized by. They think it's not a good game without a license.

Landeros: It's very seductive. You've got the *Lion King*. I think it was offered to us, and what are you going to say? It's very powerful stuff, but we said no. I'm glad we did. Maybe someday we'll be making Hollywood games. But I think *Clandestiny* is a good start. If there's as much to this whole interactive movement as everyone seems to think.

Devine: Yeah, the problem is that there's so much hype. Do people really want interactive media? Towards the end of any millennium, things get totally unpredictable.

Landeros: I myself am not a true believer in interactivity. I think it's interesting. . . .

Devine: You're a true dabbler.

Landeros: A true dabbler. But everyone else seems to think this is the hot thing. I'm not convinced, because you look out there and there's not that much satisfactory interactive experience out there. We're out to prove that there is something there. ❦

Trilobyte didn't want to talk very much about *Dog Eat Dog,* but they sent us a bunch of images from it. This one says it all. It's an interactive experience about interoffice politics. Its script is over 2,000 pages long. It's full of mature situations. Its release date has not been set. Stay tuned.

PUTTING TOGETHER AN INTERACTIVE MULTIMEDIA SYSTEM IS LIKE OPENING A CAN OF WORMS*

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AUDIO ASSETS
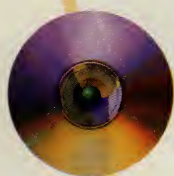
Third-party prebuilt audio assets come in a variety of shapes, sizes, and flavors to meet just about any need imaginable.

Let your audience time-travel with radio broadcasts, speeches, and other documentary recordings from yesteryear. For those musically challenged content developers who don't have a symphony orchestra hanging around the office, prerecord- **BY LEA ANNE BANTSARI** ed background music may set the right mood for your interactive title. Sound effects? Boom, crash, zip, zap. They're captured on CD and waiting to be loaded into your app. Or, compose the soundtrack yourself and create your own dream ensemble using collections of instrument samples. ● As *InterActivity*'s Stock Media series continues, we look at the types of audio material available, the formats they're

delivered in, the fee and licensing structures you'll encounter, and of course the list of who's offering what.

Documentary Recordings

Step back into the past. Be in the control room of a space mission via NASA sound recordings of air-to-ground communications. Track the rise and fall of the Berlin Wall. Hear notable personalities such as Mark Twain, Babe Ruth, Adolph Hitler, Groucho Marx, and Frank Lloyd Wright in interviews, readings, and speeches. Listen to oral arguments of the Supreme Court. Track the progression of White House residents through presidential speeches.

Among audio content providers offering historic sound bits is Archive Films/Photos, whose primary business is licensing historical film and photographs. They now represent the Gordon Skene Audio Archive, a collection of speeches, press conferences, readings, radio commercials, and audio coverage of events such as World War II, Watergate, and the civil rights movement. The content ranges from the 1890s to the present. The material is held on tape, transcription discs, 78s, and LPs; it's delivered on audio cassette, DAT, or CD.

News organizations such as CBS and BBC license audio material from their radio broadcasts. The BBC's collection includes news, drama, music, current events, and educational radio programming from the 1920s to the present.

Fees for documentary audio can range from $10/sec. to $50/sec. Licensing arrangements and costs are negotiable and determined by the nature of your project.

The National Archives and Records Administration is another source for audio. They've got radio broadcasts, NASA sound recordings (air-to-ground communication, astronauts' voices, speeches, press conferences), and Supreme Court oral arguments, to name a few types of material. Most of that content is in the public domain, but be sure to fully check the copyright status of the material you wish to use. And allow some extra time when working with the National Archives. It can take several weeks to locate and duplicate the materials you want.

Music

Rock, blues, hiphop, country, jazz, industrial, classical. Uptempo and energetic. Slow and romantic. Pick your style. Production music libraries have got it covered.

The trick is finding the music you want. Most music libraries have catalogs describing their collections. But not everyone uses the same words to describe musical qualities. See if the company will send you a free demo CD (you may need to pay shipping and handling).

Some libraries distribute their catalogs on software that has search capabilities. Some offer demos on phone lines or on their Web sites. Still others have combined the search and demo features on CD-ROM. For example, on Network Music's CD-ROM catalog, select from a directory of 300 keywords describing emotions, music styles, and instruments. You'll get a listing of themes that fit your parameters. Click on a title and listen to a 29-second demo of the music.

Traditionally, music libraries have licensed music a couple ways. One is under a blanket license agreement that allows you to use the library for a specified period of time. The other is on a per use, per clip, or "needle drop" basis where you pay for only what you use, when you use it. Licensing fees are determined by the nature of your project — the kind of exposure it'll get, the length of the music used, the length of the program as a whole, how many units you're planning to sell, and the retail price.

Like other companies, Network Music offers a blanket agreement where you can use the entire music library on an annual- one-, two-, or three-year basis. For a blanket fee, you can use anything out of the library. Or, under a different licensing plan, pay as you go. A third option allows a user to pick as few as 15 CDs from the library and pay a lower blanket fee.

While licensing stock music is easier than getting popularly released music, producers cringe at the hassles of licenses and royalties and the paperwork that's part of the package. Many third-party content providers now package music selections on a CD and sell them on a royalty-free buyout basis, sometimes referred to as a one-time licensing fee.

"The means and the technology available today allows us to produce higher quality and similar quality music as licensed companies, and it's a lot easier for the end consumer," says Kirk Cirillo of Chameleon Music Production Library. "That's really what it's all about. Buyout in the beginning got a very bad reputation because the very first buyout libraries years ago were what I would call gigging musicians sitting at home with a synthesizer just producing music off the top of their head. That doesn't really fulfill what people need. People want everything from orchestra scores to real piano and well-written pieces. You used to get that only in licensed music, but the cost reflected that. You were paying 10 or 20 times for that music, and that's why. So now you can do that on a buyout level. I think that people are more satisfied with it and more open to it. It's definitely going to be the way they're going to go."

John Cameron, president of British Audio Designs, agrees. Which is why the music in his productions with Patrick Moraz and Christopher Page are sold on a royalty-free, buyout basis. "I think it's hard for CD-ROM producers or film producers or producers in any other situation to find the music they want," he says. "It really is. There's the hassle. The way I look at the situation, offer someone a product that has such a wide diversity of music stylistically and forget the licensing situation. Just give them the music,

let them do what they want with it."

As with most royalty-free, buyout materials, these music cuts cannot be resold as part of other audio collections. Always check the fine print in case libraries have other restrictions on how you can use their collections. Be sure of the exact license.

What guarantees do they offer? Will they be in business a few months from now when you need them? "Don't buy anything that you can't return, or what I would call a blind sale," Cirillo says. "You want to be sure the company's going to be there for you, too. There's a lot of fly-by-nighters in the industry."

Do they offer technical support? "There's so many programs to create in today," Cirillo says. "When this all started to take off last year, you had Adobe Premiere and Macromedia Director. And those were the major ones. Now there's dozens of smaller programs, but they don't all support a lot of ways to get the audio in, so we're constantly helping people with how they can get the audio into those programs correctly. They get frustrated, and sometimes they blame it on the product instead of the means. We're there now with support on that end."

Most music comes in CD audio format, offering around 70 minutes of music per CD in a price range of around $30 to more than $1,000.

Licensing audio, whether it be popularly released music or stock music, is nothing new. Feature films, television, radio, and advertising have done it for years. Multimedia, however, often throws some technical twists on tradition. High quality audio consumes major megabytes of space. In many cases, data compression is the name of the game. Plus, the size and quality of computer speakers aren't exactly ideal.

"Be aware of what format it's on because the quality can vary," Cirillo warns. "Some people sell their music on ROMs, not CD audio. A lot of times that music is not at full bandwidth. I think it has to be the best to start with, especially if it's going to end up in a computer speaker. It can really suffer if it's not top quality to begin with. Sometimes it can go through two or three conversion processes before it ends up being on the final product and that can affect the way it sounds if you're not careful."

Yet, depending on your project and your audience, some CD-ROM collections might be a perfect solution. Cambium, for example, offers a two-volume CD-ROM set that covers a wide range of musical styles in various lengths and bumpers that can be used as transitions, groove loops, and finales. The musical cuts come in six WAV and two General MIDI formats, plus CD audio. Because the collection is on CD-ROM, it is also able to include searching and some editing capabilities.

Another possibility is Network Music's Presentation Audio. Network has taken the CD-quality audio of its professional music library and placed it on CD-ROM at 22kHz, 16-bit stereo.

LEGAL LAND MINES

HOW TO AVOID LICENCING LITIGATION

Using third-party content. Just buy it, slap it into your app, and you're ready to roll, right? Not quite. For a lot of stuff on the market, sure. But check the fine print. Be sure you've got all the clearances you need. Music and sound effects have their own nuances when it comes to copyrights, clearances, and licensing agreements. The article "Rock & ROM" in *InterActivity*'s July/August 1995 issue outlined a step-by-step process for getting one kind of music rights. Here, two industry insiders (Bruce Tucker, vice president of business and legal affairs at Network Music, and Jill Alofs, president of Total Clearance in Mill Valley, California) discuss licensing and clearance issues — stuff you need to know when using audio of the music library and sampled variety.

ON MUSIC RIGHTS

Bruce Tucker: With most music, you're talking about two distinct copyrighted elements: the underlying composition and the recording of it. Suppose you're dealing with popular music, and when I say that I mean music that's been released popularly, let's say a Billy Joel tune. To use that Billy Joel recording, you would need to contact the publisher of the composition as well as the owner of the recording. So you're really negotiating with two different parties to get rights. [For details, as well as information on performance, synchronization, and other rights, see "Rock & ROM" in our July/August '95 issue.]

ON STOCK MUSIC

Jill Alofs: If you're using stock music in a production, you need to go to the individual or the company that has the particular music. I would strongly urge that you have in your agreement an indemnification, or that they warrant and represent that they own 100% rights to that particular music. And that they indemnify you for any problems. They're supposed to and most of the time they own the music outright, but there are instances where they might not know. Or they might think the music is in the public domain, and it may not be for that particular composition for the usage you're seeking to gain rights to. So it is something you need to be careful about and be sure you're fully covered for your intended usage. Provided that all that meets with the requirements, then you're okay. I would make sure there are no musician union issues, no other issues. So that when you purchase this material, you're purchasing it outright for your specific usage, including all guild, union, third-party rights, everything.

Bruce Tucker: When it comes to production music library companies, you're typically dealing with one company. In the case of Network, we own both the publishing to the composition and the recording. So it's one-stop shopping. That's why companies such as Network are successful at what they do. They cater to people who use music all the time, and our licensing system and administrative department and everything here are designed around making it as easy as possible to utilize and license our music.

ON SOUND EFFECTS

Jill Alofs: If you're using sound effects, there aren't all these other issues. You just deal with the copyright holder that's involved in that particular piece of content. If it's any type of trademarked sound, then you need to deal with that as well. Take James Brown's scream. That particular sound is trademarked. So you can't use that. It's recognizable. If you can distinguish it as recognizable for his trademark, because that's what he's known for, then you can't just go ahead and use that particular material. Although you think it's only one note, that's not necessarily the case.

Bruce Tucker: You take out the musical composition part of the equation and it's just a sound recording. So, what they're licensing is often called a master use license. It's the right to use the individual sound effects, the recordings of the effects. Those are typically dealt with on what is called a buyout basis. From my point of view, I prefer a one-time license fee because there are limits to what people can do with it. It's not really a complete buyout. For example, if someone were to license our sound effect library, it wouldn't include the right to take those sound effects and put them on another CD and sell those CDs to somebody else. But they can use the individual effects from the library in their productions or on records or whatever they want.

ON MULTIMEDIA, BROADCAST, AND NONBROADCAST

For licensing purposes, traditional media are often classified by broadcast and nonbroadcast usage. Where do interactive apps fall into that classification?

Jill Alofs: There's a good side and a bad side to that. There really aren't any rules set yet in multimedia because there are so many different uses for multimedia and so many different products. No one has really determined, "this falls into this category," and "this falls into that category." Oftentimes the line is blurred.

The downside is that it's very difficult for a developer to budget. How do they know? They want to use a particular piece of material, but they don't really know what's going to be involved. Okay, now they've identified what's going to be involved, but you're looking at all these different usages, and you just can't call one single source and say, "tell me what the rate is going to be," like you can with some of these others. So that's difficult for the developer.

With the other media sources you do have a limit, a defined spectrum. It's either this or that or somewhere in that range. Since that doesn't exist in multimedia, you can come up with some very creative negotiations. We've been

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able to get some phenomenal deals that we couldn't get in other media sources simply because if the artist is seeking additional exposure, this is the perfect arena to capitalize on that.

I think as long as you approach it with good faith intentions and are upfront about exactly what your intended usage is, you can work together to find some creative ways that capitalize on this new exposure. We've had wonderful success in that area, much more than in the other traditional senses, again because there are these limits and boundaries.

DO'S AND DON'TS

Bruce Tucker: Don't use music without a license. Don't go down to the store and buy CDs and use them in your production and think that there's no harm in doing that or no one gets hurt or that you won't ever get caught. The copyright laws in the United States are fairly clearcut when it comes to infringement. It's really a mistake in a business setting to do that.

Jill Alofs: Don't wait until the last minute. Start as early as you possibly can. Even if you're just starting to think about these issues, it's better to get information because you might be setting up all the visuals to accompany your particular music, and you may not be able to get it. It may not be within

your budget. It may not be within your time frame. Allow ample time so should that occur, you can fall back on a B plan.

Be broadminded about the usages and the way you intend to incorporate this material into your product. Think in terms of its being extremely successful. What are your minimum needs and what are your maximum needs in that type of scenario? Think about the broader spectrum and come from a position of power in negotiating. If you wait until the last minute, you really have forgone a lot of your power.

Be clear on how you intend to modify or alter the content. That's very important for the rights holders. If you're going to do this on your own, if you're not going to a stock house but going to the individual rights holders, be able to define what exactly your product is in layman's terms. Oftentimes they just get overwhelmed and they don't understand what multimedia technology is at this particular point. It becomes too overwhelming for them and they don't want to deal with it.

And I have found the simpler you can keep things, the better. For example, say you hire your attorney to deal with this. Oftentimes, they're going to an individual music publisher who might actually be the artist himself who has set up this label or publishing name. The artist may feel, "Oh my gosh, I got a call from an attorney of so-and-so and so-and-so. I had better get my attorney involved." It automatically starts to escalate. Because if you're only going to offer them $200, it cost them $200 an hour to retain their attorney to look at your document that you want them to sign to grant those rights. Keep things as simple as possible. 🐾

"On literally 99% of the computer speakers, it's going to sound great," says Bruce Tucker, vice president of business and legal affairs for Network. "We've formatted it because audio uses a tremendous amount of space. One minute of stereo, CD audio-quality audio is a little over 10MB. It's just too big a file to lug around, and for the sound quality difference it's just not worth it."

The Presentation Audio collection consists of five volumes based on themes such as business, pop culture, high tech, environments, and comedy. Each volume includes music in 60-second, 30-second, and short tag versions, as well as a loop version; sound effects; and production elements, such as glides and sweepers that combine musical elements with electronic sound effects. For a one-time fee the audio can be used in nonbroadcast, computer-based presentations as long as it's combined with text or visual elements.

Sound Effects

Sounds from the air, the sea, the city, the office, your house. Animal calls. Screams, cheers, laughs, and knocks. Ping. Bang. Zoink. Thousands of sound effects on CDs and CD-ROMs can add zest to your project. Many sound effects come in audio CD, WAV, or AIFF files, but some also come formatted for specific digital audio sampling instruments (see next section).

With most sound effects collections, you pay a one-time licensing fee and the collection is yours to use as you wish. The standard restric-

tion is that the sound effects cannot be resold as part of another collection.

Sampled Musical Instruments

Sampled musical instrument sounds run the gamut: orchestral instruments, guitars and bass, piano and keyboards, and percussion, as well as exotic third-world instruments and dramatic synthesized textures. While most companies offering instrument samples have catalogs to help you find what you're looking for, some also have put their catalog on CD-ROM. For example, launching East-West Soundwarehouse's CD-ROM catalog, you select a sampler type and then a sound category such as brass, guitar, or sound effects, and you'll get a list of titles. By clicking on a specific title, you'll get information, reviews that have been written about it, and an audio demo. East-West Soundwarehouse also has jukeboxes containing 100 CDs in 60 major musical instrument stores throughout the United States and Canada. Rather than a demo, you can listen to the CD itself, track by track.

The latest trend in sample libraries is to provide not single notes, but fully performed phrases that can be assembled and fleshed out into semi-original music. In many cases these phrases are performed by top session players, who apply their ample skills and talents to riffs in a variety of styles, keys, and tempos. This is an outgrowth of the popularity of "drum loops," or rhythms that can be repeated (looped) to provide a bed over which live musicians play an original composition.

Drum loops offer an easy way for songwriters and composers to get started. Likewise, they can provide a convenient "temp track" for multimedia productions in progress, setting an appropriate tempo, style, and mood for video editing and other tasks. With the increasing availability of similar kinds of material performed on other instruments, it's possible to build an entire composition out of various looped phrases. For instance, a funky drum loop might provide the groove, a looped bass line define the key, a sampled piano chord pattern fill out the middle, and sampled guitar licks play over the top — musical tinker toys.

This kind of production requires a fairly capable sampling system and the technical knowledge both to operate the sampler and to assemble a coherent musical jigsaw puzzle. However, it is a viable option for creating "original" music custom-made for your projects quickly and inexpensively. Often credit on the end product's package is all that is required beyond the initial cost of the sample library.

What makes for a good collection of samples? It's a matter of your application and needs, but quality depends on how well they were recorded and whether the entire range of the instrument has been captured. Badly placed loops can interject clicks, pops, and audible artifacts that detract from realism. Sometimes companies will sample a portion of an instrument and then pitch shift it to get the other notes. The farther you go from the original pitch, the weaker the sound quality.

"Once it gets recorded, very few people in the industry really know how to get it into the computer and map it out and tune it and sample-rate convert it, and apply the envelopes," explains Denny Mayer, vice president of sales for InVision Interactive.

Almost all digital samples are sold in buyout collections with prices ranging from a few bucks for a sample or two to hundreds of dollars (or more) for collections on CD or CD-ROM. You pay a one-time fee and the material is yours to use. "When they purchase it, they own it," says Mayer. "They can do anything they want with it. It's our goal that they have hit records and hit movies with it."

East-West's instrument samples are designed to be used in music production. "If someone were doing a game or multimedia CD-ROM where the sounds themselves were exposed to the end user, that would require a separate license from us. But if it's embedded in a piece of music, that doesn't require any separate license," says East-West president Doug Rogers.

Some companies request that you register uses with them. At East-West and InVision Interactive, such registration does not mean more money out of your pocket. It's really just a way to keep track of what people are doing with the product.

Most instrument sample collections come in file formats for specific samplers. So if you're using an Akai sampler, you'll want Akai-compatible samples. While many samplers claim to be able to read a variety of sample formats, translation is not always as easy as manufacturers would have you think. Loops, crossfades, key maps, and the like frequently get dropped in the transfer process.

Mayer of InVision Interactive advises, "People may want to ask, 'Have these sounds been optimized for my environment?' If you buy the CD audio, you're on your own. It's raw material — like buying some basic raw fonts, you need to tweak them with the draw program to get them just right. So if you're a multimedia developer who's working on the Macintosh, you might want to ask, "Have these sound files been optimized for my Mac or PC?"

Many clips also come as WAV files for the PC or AIFF files for the Mac.

MIDI Files

Depending on your needs, a MIDI sequence may be the musical answer for your app. A variety of popular songs, public-domain compositions, encoded performances by notable musicians, and more are available in this form.

The main file format for sequences is the Standard MIDI File, which comes in two versions: Type 0 and Type 1. Type 0 files contain one track that combines all 16 MIDI channels. "It's a more efficiently packed file," explains Tran Whitley, president of Tran Tracks. "And MIDI file players — that is, devices that play these songs

directly off the disk — have an easier go of it if there's only one track to keep track of."

Type 1 files contain a separate track for each MIDI channel, making them more difficult for the playback system to read, but simpler for the developer to manipulate. Using a MIDI sequencer you can name tracks, such as bass, piano, trumpet, and so forth, and edit them independently or en masse. Once you're finished, you may want to save the edited version as a Type 0 file.

"The beauty is that you can change it," Whitley says. "That's what sets MIDI apart from all other forms of music. You get this predesigned masterpiece, but you can make your own new masterpiece out of it. You can change the string sound to a clarinet. You get all the other interactivity that goes with it — change the tempo, change the key, make the solo longer, throw away the parts you don't need, add some new parts. It's endless, and that's what draws people to MIDI — flexibility."

When using MIDI files that you didn't create yourself, be careful. As with other music formats, you may have additional rights to clear.

"You license the performance aspect from the MIDI sequence holder, just like you would license a master recording from a record company," says Ronny Schiff of Ronny Schiff Productions. "Then you need to negotiate the music part of it from the copyright owner of the music — not the owner of the performance, but of the underlying song."

In the case of Tran Tracks, "We've arranged with the publishers to make a MIDI file, a MIDI arrangement, of a song that they own," explains Whitley. "We pay them a royalty for each sale of the song as a MIDI file. We are playing a straight-up game here and paying the royalties."

Users of Tran Tracks MIDI files have the right to use this music endlessly in live performance (in which case the performance venue itself, technically, is responsible for paying the performance royalty, usually to ASCAP or BMI, which disburses the money to the copyright holder). However, they are not licensed to make a musical recording based on the MIDI data, synchronize that with a QuickTime clip, incorporate the clip into a game, and sell it on CD-ROM. To do that would require permission from the copyright holder of the song.

"The song doesn't belong to us. Only the arrangement belongs to us, which gives us certain intellectual property rights. But the rights of the owner of the copyright of the song itself remain unchanged," Whitley says.

"Music based on a MIDI sequence is subject to the same licensing requirements as if it were recorded music from any other source," Schiff adds. "It's treated the same way. In MIDI, there's a potential for manipulation and printout of the score that doesn't exist in other forms of recorded music. That's why you may get turned down by the copyright holder." [For more information

on music rights, see "Rock & ROM" in the July/August 1995 issue of *InterActivity*.]

Have Them Sign Before You Sing

You'll also want to make sure the company you're licensing from owns the copyright on the material or rights to distribute it. You don't want to put yourself at risk if the person who licensed it to you ripped it off from another artist.

How do you make sure something's in the clear? Ask, say industry insiders. And consider getting the answer in writing.

"Whoever you're buying it from, whether it be a music store or a catalog or on the Internet, make sure to ask, 'if I use this material for my own productions, is it completely safe? Can I have that in writing? I've heard rumors that there's a lot of ripped off stuff on these CDs. How can you guarantee me that this isn't?' InVision Interactive sends a little thing that says this is our contract, we own this material from the ground up, and it's yours," says Mayer.

"They have to look at who they're dealing with and the reputation of the company and how long they've been around," Tucker says. "It's like anything. If you buy a car from GM, you probably figure they're going to be there in a month or two. Same thing with a music library company. What their reputation is. How big their library is. How long they've been around. If they look like a stable group and their materials look professional, that's a pretty good sign.

"The second thing is that you can ask for it in writing, potentially in your license agreement, some sort of representation and warranty clause that says we have the rights that we're granting. Potentially, you could even add an indemnification clause that would say, we'll indemnify you if we don't have the rights and you get sued."

Grand Finale

Finally, take the time to find the right music and sounds. Go for the added pizzazz. If it means a little extra money, seriously consider spending it. It could mean the difference between a title that's forgotten by next Christmas and the blockbuster everyone keeps talking about.

"It's always the last thing to be considered," Cirillo says of audio. "But I think that's changing. I say that because I see it starting in the CD-ROM game area. You look at the current topselling games like *Myst* or *The 7th Guest*— there's some pretty good serious music on those. They've gone so far as to give credits and hire music production crews. That's a good start. I like to see things like that. That means they're taking it seriously. They're obviously seeing what a difference it can make. People don't understand that. They think they can throw in the audio track behind the thing. It may work, but just a little more effort might have made so much of a difference it could have resulted in more money to them via sales because it was more appealing." 🐝

STOCK AUDIO SOURCES

3D Sounds
Box 22065
50 Westmount Rd. N.
Waterloo, ON N2L 6J7
Canada
519.747.0282
dwhite@in.on.ca
Sampled instruments, sound effects, phrases/loops, MIDI files: Drums, synths, orchestral, pianos, organs, acoustic and electric guitars. Drum loops in a variety of styles. MIDI files of familiar pop, rock, jazz, dance, classical, and original music styles (not for commercial use). Each CD has 100s to 1000s of files.
Format: Audio CD, WAV CD-ROM, Ensoniq CD-ROM, MIDI files CD-ROM.
Licensing: Royalty free.
Cost: $35-$49.
Reader Service #125

Aircraft Production Libraries
162 Columbus Ave.
Boston, MA 02116
800.343.2514
617.482.7447
617.542.7222 FAX
Fully produced production music: 70 CDs of music of all genres, including The American Music Series, which features music from the Revolutionary War era, the Civil War era, early folk music, two volumes of jazz, and early rock and roll. Over 4,400 edits from :05-second to full-length versions.
Format: Audio CD.
Licensing: Time-limited blanket licenses.
Cost: Based on license and nature of project.
Reader Service #126

Akai Professional
Box 2344
Fort Worth, TX 76113
817.336.5114
817.870.1271 FAX
Reader Service #127

Angel City
2 Liberty P.
Middletown, CT 06457
860.347.5166
Sampled instruments, sound effects, phrases/loops: 36 disks for many styles and instruments, with focus in world music, vintage keyboards, and analog synth sequences. Each disk has 30-200 programs.
Format: 3.5-inch disks for Korg T series synthesizers.
Licensing: No restrictions except for fully produced music, which must be

arranged individually.
Cost: Royalty-free buyout.
Reader Service #128

**Archive Films/
Archive Photos**
530 W. 25th St.
New York, NY 10001
800.876.5115
212.620.3955
212.645.2137 FAX
71333.1025@compuserve.com
Documentary audio: Interviews, press conferences, readings, speeches, radio broadcasts from 1890s to the present.
Format: Audio CD, cassette, DAT.
Licensing: Per clip. Negotiable, based on usage.
Cost: $10/sec to $50/sec, based on license.
Reader Service #129

Associated Production Music
6255 Sunset Blvd., Ste. 820
Hollywood, CA 90028
800.543.4276
213.461.3211
213.461.9102 FAX
Fully produced music: Over 1,200 CDs in categories such as orchestral, pop/rock, sports, drama, classical, stings and links, new age, corporate, documentary, etc. APM represents nine music libraries including KPM, Bruton, Sonoton, Carlin, Selected Sound, and Castle.
Format: Audio CD.
Licensing: CDs are leased and music is licensed on a needle drop or per use basis.
Cost: Varies.
Reader Service #130

Audio Action
4444 Lakeside Dr., Ste. 340
Burbank, CA 91505
800.533.1293
818.845.8039 FAX
Reader Service #131

AV West
2727 W. Southern Ave.
Tempe, AZ 85282
602.438.2959
602.820.9309 FAX
Reader Service #132

BBC Library
3500 W. Olive Ave., Ste. 110
Burbank, CA 91505
800.966.5424
818.840.9770
818.840.9779 FAX
michael.goodell@bbc.co.uk

747 Third Ave., Ste. 600
New York, NY 10017
212.705.9300
212.705.9342 FAX
karen.baker@bbc.co.uk

55 Howard Ave., Ste. 111
Toronto, ON M4M 2P5
Canada
416.469.1505
416.469.0642 FAX
Documentary audio and sound effects: Radio programming from 1920s to the present. BBC Worldwide Radio (news, drama, music, current events, education) and sound effects.
Format: DAT
Licensing: Negotiable, based on project.
Cost: Negotiable.
Reader Service #133

BeachWare
9419 Mt. Israel Rd.
Escondido, CA 92029
619.735.8945
619.735.8945 FAX
tomg@beachware.com
Sound effects: Over 2,000 sound effects sold in collection.
Format: CD-ROM — SoundEdit and System 7 (Mac), WAV (PC)
Licensing: Royalty-free buyout.
Cost: $19.95.
Reader Service #134

Beatboy Drum Sequences
HCR1 Box 1A 193
Lackawaxen, PA 18435
800.838.2328
717.685.1338
717.685.1573 FAX
beatboytec@aol.com
MIDI files: General MIDI-compatible Standard MIDI File performances by drummers such as Nigel Olson, Rod Morgenstein, and Eddie Bayers. Styles include rock, progressive rock, country, pop. Artist disks contain 20 complete songs. Ultima 3000 is 3,279 measures of drum and percussion patterns.
Format: 3.5-inch floppy disks.
Licensing: Royalty-free buyout.
Cost: $19.95-$125.95.
Reader Service #135

Big Fish Audio
11003 Penrose St., Ste. C
Sun Valley, CA 91352
818.768.6115
818.768.4117 FAX
Fully produced music, MIDI files: *Clip Tunes Classical* — 30 classical pieces

in 5-, 15-, 30-, and 60-second versions.
Format: CD-ROM — 22k WAV, 11k WAV, MIDI.
Licensing: Royalty-free buyout.
Cost: $99.95
Reader Service #136

Blue Palm Productions
111 Mansfield Pkwy.
Morehead City, NC 28557
800.926.2583
919.247.1058
919.247.1058 FAX
Fully produced music and MIDI files: Jazz, world, and rock styles — non-vocal arrangements, 18-42 cuts per CD.
Formats: Audio CD, 3.5-inch disks for Ensoniq VFX-SD (Mac coming soon).
Licensing: Royalty-free buyout.
Cost: Flat fee +/- $50
Reader Service #137

British Audio Designs
865 Bolsa Way
Laguna Beach, CA 92651
714.470.1388
714.470.0856 FAX
DGlenFline@aol.com
Fully produced music: Albums by John Cameron, Christopher Page, and Patrick Moraz. Contemporary, symphonic, neoclassical, world beat fusion, contemporary rock, pop. Custom services available.
Format: Audio.
Licensing: Royalty-free buyout.
Cost: $285 per album.
Reader Service #138

Cambium Development
Box 296-H
Scarsdale, NY 10583
800.231.1779
914.472.6246
914.472.6729 FAX
Phrases/loops, fully produced music, MIDI files: Two-volume set of 57 selections, 217 clips, and 1,793 music files in classical, jazz, rock, pop, country, and new age styles. Sold as a collection and bundled with Astound, Q-Media, and Turtle Beach.
Format: Audio CD; WAV, MIDI CD-ROM.
Licensing: Royalty-free buyout.
Cost: $69.
Reader Service #139

Canary Productions
Box 202
Bryn Mawr, PA 19010

610.825.5656
610.825.8310 FAX
Phrases/loops and fully produced music: 15 themes per disc with three versions each: full, 60-second and 30-second. Country, industrial, new age, '50s rock, international, news/action, corporate, moods, mellow, and others.
Format: Audio CD, WAV CD-ROM.
Licensing: Royalty-free buyout. User may not relabel and resell.
Reader Service #140

Cascom International
806 Fourth Ave. S
Nashville, TN 37210
800.889.0477
615.242.8900
615.256.7890 FAX
Sound effects, fully produced music: *Select Effects Image Library* — 100 audio clips. *Vortex Music Library* — 14-CD set of music in all styles. Sold as a collection.
Format: Audio on CD; WAV, AIFF CD-ROM.
Cost: Varies.
Reader Service #141

CBS News Archives
524 W. 57th St.
New York, NY 10019
212.975.4321
212.975.5442 FAX
Reader Service #142

CDA Interactive
701 7th Ave., 6th Fl.
New York, NY 10036
800.237.2448
212.575.0296
212.575.4799 FAX
cdai@echonye.com
Sampled instruments, sound effects, phrases/loops, fully produced music, MIDI files: Stingers, ambiences, sound effects, all musical styles. Each CD has 99 clips.
Format: Audio, Akai, WAV, AIFF, SoundDesigner II, provided on CD, floppy disk, CD-ROM, DAT, audio cassette,1/4-inch, Betacam SP, 1-inch, 3/4-inch.
Licensing: Negotiable.
Cost: Varies.
Reader Service #143

Celebrity Licensing
6711 Forest Lawn Dr., Ste. 100
Los Angeles, CA 90048
213.876.9615
213.876.1810 FAX
Fully produced music: Nostalgic hit recordings in various genres.
Format: CD, DAT.
Licensing: Per use basis depending on usage.
Cost: Varies.
Reader Service #144

Chameleon Music Production Library
Box 339
Agawam, MA 01001
800.789.8779
413.789.1917
413.789.1917 FAX
chameleonm@aol.com
Sound effects and fully produced music: Thematic CDs covering all styles. Each CD has 72 minutes of music, with 50 to 70 clips per CD.
Format: Audio CD.
Licensing: Royalty-free buyout.
Cost: $30 per CD.
Reader Service #145

Creative Support Services
1950 Riverside Dr.
Los Angeles, CA 90039
800.468.6874
213.660.2070 FAX
Sound effects and fully produced music: 15 libraries (123 CDs) covering industrial, corporate, country, classical, new age, light jazz, historical, and more. Each CD has an average 15 base selections (long, 60-second, 30-second); average 45 tracks. Sold by the disc or as a mixed and matched collection.
Format: Audio CD.
Licensing: Cannot be used as part of authoring or enabling software where music can be used by unauthorized third parties.
Cost: $99 per CD (multiple library discount available).
Reader Service #146

CyberSounds/ Sherwood Music
124 Ottawa St. S.
Kitchener, ONT N2G 3S9
Canada
519.745.0021
519.745.0953 FAX
sbrenner@ophelia.waterloo.net
Sampled instruments, sound effects, and phrases/loops: Each CD has about 600MB of data or about 70 minutes of audio in electronic, techno, dance, and ambient styles.
Format: Audio, WAV, AIFF, Ensoniq, Yamaha, EPS/ASR, Mirage, TX-16W files on CD and PC format CD-ROM.
Licensing: Royalty-free buyout.
Cost: $32.95-$47.95 per CD.
Reader Service #147

Davenport Productions
Box 25636
Charlotte, NC 28229
800.951.6666
704.535.4171
704.535.4155 FAX
Fully produced music: A variety of music styles on 19 volumes. Each CD has 70 tracks — 10 full-length and 60 short edits.

Format: Audio CD.
Licensing: Royalty-free buyout.
Reader Service #148

DeWolfe Music Library
25 W. 45 St.
New York, NY 10036
800.221.6713
212.382.0220
212.382.0278 FAX
Sampled instruments, sound effects, and fully produced music: Music library of more than 200 CDs, 36-40 new each year. Licensed as individual cuts and as collection.
Format: Audio CD.
Licensing: Negotiable.
Cost: Varies.
Reader Service #149

The Digital Kitchen
5936 Hillview Ct.
San Jose, CA 95123
408.566.9098
408.225.6935 FAX
ngoyer@dkitchen.com
http://www.dkitchen.com
Sampled instruments, sound effects, and phrases/loops: Music loops, sounds, and individual instruments for industrial, hiphop, rap, dance, ambient, techno, and Gothic music. Collections range from a three-CD set of 3.5 hours of industrial rhythms, individual instruments, and sound effects, to a single CD with 70 minutes of hiphop material.
File formats: Audio CD
Licensing: Royalty-free buyout. With the exception of other audio sample related products, Digital Kitchen products are license free in commercial or private use. Finished product must be submitted to Digital Kitchen prior to distribution; credit must be given in product, and Digital Kitchen may use the production title, cover, and artist name for promotional purposes.
Cost: $40 (60-minute CD) to $150 (3.5 hour CD set).
Reader Service #150

Dimension Music & Sound Effects
Box 992
Newnan, GA 30264-0992
800.634.0091
770.502.8744
770.253.9388 FAX
73573.3436@compuserve.com
Sound effects and fully produced music: Over 70 CDs of production music and sound effects covering all types and styles. Demo CD available.
Format: Audio CD
Licensing: Buyout; user receives a blanket license.
Cost: $50 per CD (music), $45 per CD (sound effects).
Reader Service #151

Dinosauremains
10702 Sagewillow
Houston, TX 77089
713.481.1256
Sampled instruments and sound effects: Classic vintage sounds (three or four instruments per disk) including Moog Taurus Pedals, Mellotron, Orchestron, Vocoder.
Format: Ensoniq EPS-16 Plus or Ensoniq EPS on floppy disk.
Licensing: Royalty-free buyout.
Cost: $14.95 per disk.
Reader Service #152

DrumTrax
51 Pleasant St., Ste. 218
Malden, MA 02148
508.977.0570
508.977.0809 FAX
MIDI files: Drum pattern libraries sequenced by live drummers in a variety of styles. 13,000 measures available.
Format: PC MIDI file, Mac MIDI file, Kurzweil, MOTU, Performer, Twelve Tone Systems Cakewalk on floppy disk.
Licensing: Royalty-free buyout.
Cost: $149 per disk.
Reader Service #153

East-West Soundwarehouse
345 N. Maple Dr., Ste. 277
Beverly Hills, CA 90210
800.833.8339
310.858-8797
310.858.8795 FAX
eastwest@aol.com
Sampled instruments, sound effects, phrases/loops: CDs in categories such as dance, synth, world/vocals, drums/percussion, guitars/bass, pianos/keyboards, classical/orchestral, brass, multi category, sound effects/multimedia.
Format: CD and CD-ROM for various samplers.
Licensing: Royalty-free buyout; user can only use sounds/loops in music.
Cost: $49.95-$895 per CD.
Reader Service #154

ELS Productions
882 Walden Meadows Dr.
Murray, UT 84123
800.927.3472
801.265.8426
801.266.5226 FAX
Reader Service #155

EMC Productions
300 York Ave.
St. Paul, MN 55101
612.771.1555
612.772.5196 FAX
Reader Service #156

E-mu Systems
1600 Green Hills
Box 660015
Scotts Valley, CA 95067-0015
408.438.1921

408.438.8612 FAX
Reader Service #157

Energetic Music
Box 84583
Seattle, WA 98124
800.323.2972
206.467.7101
206.467.8179 FAX
Sampled instruments, sound effects, fully produced music, MIDI files: Production music library and sound effects in a variety of styles. Each disc has eight to 96 cuts. Cuts range from mere seconds to 10 minutes.
Format: Audio, WAV, and MIDI on CD and CD-ROM (Mac).
Licensing: Royalty free buyout.
Cost: $59.95 to $199.95 (three-disc set).
Reader Service #158

Ensoniq
155 Great Valley Pkwy.
Malvern, PA 19355
610.647.3930
610.647.8908 fax
Reader Service #159

Eye & I Productions
930 Jungfrau Ct.
Milpitas, CA 95035
800.726.7664
408.945.0139
408.945.5712 FAX
Sampled instruments, sound effects, loops/phrases: Wide range of instruments and styles. More than 75 percussion instruments; multiple synth layers and textural samples, drums, and urban sound effects; noise loops; 1,000s of measures of loops — drums, bass, individual industrial samples, and peculiar percussion; analog synth setting samples and analog drum machine samples; hiphop, house, R&B, and jazzman loops, scratches, squeals, screams, vocal sound effects, fills, guitar samples.
Format: Audio, Akai, Roland, and SampleCell provided on CD and CD-ROM compatible with Ensoniq, E-mu, Akai, Roland, SampleCell, and Kurzweil.
Licensing: License free
Cost: $19.95-$189.95
Reader Service #160

FairBrothers
2201 Cocquina Dr.
Reston, VA 22091
800.469.6737
703.758.8478
703.391.2164 FAX
fairbrothers@smart.net
Sampled instruments, sound effects: 780 samples of guitars, pianos, drums and percussion, orchestral instruments, synths, etc., on CD; 75 disks have about 2000 sound effects. Bundled

with Audio Gallery Language products.
Format: WAV and Amiga IFF on CD and 3.5-inch disk.
Licensing: Royalty-free buyout. User cannot resell as sampled sounds.
Cost: $1.95 per disk, $14.95 per CD.
Reader Service #161

Fearbabydisc
827 Las Vegas Blvd. S.
Las Vegas, NV 89117
800.543.2933
702.598.4483 FAX
Sampled instruments, phrases/loops: Hard rock, metal, and industrial drum styles performed on acoustic drumset — 99 tracks per CD.
Format: Audio CD.
Cost: $99.
Reader Service #162

FirstCom
13747 Montfort Dr., Ste. 220
Dallas, TX 75240
800.858.8880
214.404.9656 FAX
info@firstcom.com
Sound effects, fully produced music: FirstCom, Music House, Chappell, and Hollywood Film Music Libraries have more than 500 CDs, 11,400 themes, and 25,750 tracks of a variety of music. Audio CDs have 75 minutes of music; others vary.
Format: Audio CD), WAV, AIFF, MPEG.
Licensing: Negotiable, based on project.
Cost: Varies.
Reader Service #163

Fresh/The Music Library
34 S. Main St.
Hanover, NH 03755
800.545.0688
603.643.3438
603.643.1388 FAX
charley.comquest@valley.net
Sound effects, phrases/loops, fully produced music: Each CD has 10-13 themes, including full (approx. three minutes), 60-second, 30-second, and alternate versions.
Format: Audio CD (Red Book Audio).
Licensing: Mechanical and synchronization buyout.
Cost: $45 per CD. (Three for $99, six for $195, 30 for $695)
Reader Service #164

Gefen Systems
6261 Variel Ave., Ste. C
Woodland Hills, CA 91367
800.545.6900
818.884.3108 FAX
Sound effects, fully produced music: Distributor of sound effects libraries, including The Hollywood Edge, Sound Ideas, BBC, Omnifx, Network EFX

Guns, Sonic Boon, Dimension, Canford, DeWolfe, Digiffects, File Effects.
Format: Audio CD.
Cost: Varies.
Reader Service #165

Gene Michael Productions
441 Post Rd.
Buchanan, MI 49107
616.695.4000
616.695.4005 FAX
Sound effects, fully produced music: 33 volumes of music, ranging from rock & roll, action, corporate, film-style themes, mellow/new age, classical, country/bluegrass, and cultural — categorized by musical style. Each CD averages 12-13 song groups, most often comprised of a main theme (approx. three minutes), alternate mix, broadcast cuts (60 seconds or 30 seconds), and tags (15 seconds or less). Electronic index available for Mac (PC version scheduled for January '96).
Format: Audio CD, DAT upon request.
Licensing: Use of this music as a single element in a production is prohibited, with the exception of use in telephone on-hold systems.
Cost: $75 per CD, discounts for volume purchases, and an additional 15% discount to subscription plan members.
Reader Service #166

GMI Media Group
2012 S. 314th St., Ste. 121
Federal Way, WA 98003
206.839.9414
206.839.5112 FAX
gmi@halcyon.com
http://www.halcyon.com/gmi/
Sound effects, fully produced music: The Excellerator — 120 rock music cuts in 30-second and 60-second versions. Music beds, fully produced for commercial or presentation underscores. Hundreds of sound effects on CD.
Format: CD Audio.
Licensing: Royalty-free buyout.
Cost: $89-$185 per CD.
Reader Service #167

Grand Illusion Sequences
2607 S. Woodland Blvd., Ste. 107
DeLand, FL 32720
800.678.4487
904.734.0447
904.734.0367 FAX
MIDI files: More than 1,000 songs from the 1940s to the present in a variety of styles including country, reggae, top 40.
Format: Keyboards and dedicated sequencers including GM, Korg, Yamaha, Roland, Kawai, and others on 3.5-inch floppy disk.
Licensing: Licensed for personal use. Must arrange additional license for

commercial applications.
Cost: $14.95 per disk, $12 for six or more, $10 for 20 or more.
Reader Service #168

Greytsounds
5528 Everglades St., Ste. B
Ventura, CA 93003
805.650.8800
805.650.8697 FAX
d4410@applelink.apple.com
Sampled instruments, sound effects, phrases/loops, MIDI files: Greytsounds and Sound Source libraries.
Format: Audio, Akai, Digidesign SampleCell, AIFF, WAV, Ensoniq, E-mu, Kurzweil, Peavey, and Roland on floppy disk, audio CD, and CD-ROM.
Licensing: Negotiable.
Cost: $10-$30 per CD or CD-ROM.
Reader Service #169

Hollywood Edge
7060 Hollywood Blvd., Ste. 1120
Hollywood, CA 90028
800.292.3755
213.466.6723
213.466.5861 FAX
Sampled instruments, sound effects, phrases/loops: Construction kits of bass riffs; synthesizers and drums; pop, rock, and vintage instruments; ethnic, world and exotic instruments; classical, orchestral, and symphonic; multi-category. 16 collections of 1000s of sound effects in a variety of styles.
Format: Audio, Akai, Ensoniq, AIFF on CD and CD-ROM.
Licensing: Royalty-free buyout.
Cost: $60-$3,495, single disc or collection.
Reader Service #170

Hollywood Music Library
9000 Sunset Blvd., 3rd Fl.
Los Angeles, CA 90069
310.246.1590
818.789.3487
818.789.5801 FAX
Fully produced music: 55 CDs of digitally recorded original production music. Each CD has 74 minutes of music. Available individually, as a collection, and as part of the FirstCom/Chappel Library.
Format: Audio CD.
Licensing: Negotiable, based on project.
Cost: Rate card available.
Reader Service #171

Ilio Entertainments
Box 3772
Chatsworth, CA 91311
800.747.4546
818.883.4546
818.883.4361 FAX
Sampled instruments, sound effects, phrases/loops: Synclavier, Spectrasonics, and Propeller Island libraries.

For centuries, the art of storytelling has shaped civilization's perception of the world. Today, new techniques and new avenues of expression are reshaping a vast industry that combines entertainment and technology. This April, on the island of Kauai, you're invited to join international leaders in film, new media, music, design, and technology to explore the future of storytelling in the digital era. It's more than an opportunity to share their knowledge and learn their magic. It's a chance to work on your cybertan. Immerse yourself in: filmmaking, new media, graphic design, music and sound, technology, publishing, and... the story. Conference fee: $695. Early registration and other discounts are available. Pre-conference workshop fees vary. Call for more information. Space is limited to 400 so early registration is advised.

For registration information, call 1.800.999.4AFI or log on to http://www.afionline.org or fax 1.213.467.4578.

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for the new millennium

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Pre-conference workshops April 22–24, 1996

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Kauai Marriott Resort and Beach Club, Kauai, Hawaii

Speakers confirmed at press time include: **Harry Marks,** conference chair, broadcast graphic designer; **Dana Atchley,** San Francisco multimedia artist and digital storyteller; **Michael Backes,** screenwriter, display graphics supervisor and senior advisor for the AFI Advanced Technology Programs; **Martin Behrens,** director, Sony Interactive Features; **Rebekah Behrendt,** art director, iNSCAPE; **Peter Bergman,** co-founder Firesign Theater; **Rick Carter**, production designer; **Thomas Dolby,** musician and multimedia artist; **Barbara Kuhr,** creative director, HotWired; **Dennis Muren,** A.S.C., senior visual effects supervisor, Industrial Light & Magic; **Graham Nash,** musician and multimedia artist; **Michael Nash,** president and creative director, iNSCAPE; **John Plunkett,** creative director, Wired Magazine; **Todd Rundgren,** musician and multimedia artist; **Rick Smolan,** photojournalist; **Lisa Wellman,** director of publishing and Media Market Group for Apple Computer; **Hans Zimmer,** composer.

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Thousands of sounds in styles such as orchestral, rock and pop, and world.
Format: Audio, Digidesign SampleCell (SDII & AIFF), Akai, Roland, Kurzweil, Ensoniq, and E-mu on CD and CD-ROM.
Cost: $79-$129 (Audio CDs), $187-$499 (CD-ROMs).
Reader Service #172

Impact Music Library
Box 67
Dale, WI 54931
800.779.6434
414.779.6434
414.779.6434 FAX
impact@studioland.com
http://www.studioland.com
Fully produced music: Each CD has more than 50 cuts in a wide variety of styles and lengths (:02 to full themes of 6:30). Extensive use of real instruments. Several new releases annually.
Format: Audio CD.
Licensing: Royalty-free buyout.
Cost: $189 or less per CD.
Reader Service #173

Innovative Media Corp.
631 E. Allen St.
Springfield, IL 62703
217.544.4614
217.544.4731 FAX
Sound effects, phrases/loops, fully produced music, MIDI files: Sonic Waves 3000 For Windows — thousands of music clips, sound effects, famous speeches, and MIDI files. (Sonic Waves 1000 is a smaller version.) InterActive Classics For Windows — collection of Renaissance and Baroque music.
Format: WAV and MIDI on CD-ROM.
Licensing: Sonic Waves 1000 is royalty free. Call for others.
Cost: Sonic Waves 3000 is $99. Call for others.
Reader Service #174

InVision Interactive
2445 Faber Pl., Ste. 102
Palo Alto, CA 94303
800.458.5530
415.812.7380
415.812.7386 FAX
dennym@cybersound.com
http://www.cybersound.com
Sampled instruments and phrases/loops: Hundreds of CDs in a variety of styles, including pop, rock, percussion, ethnic, symphonic, drums, techno, hiphop, classical. Each CD has 100-1,000 sounds. Sold as individual CDs, CD collections, and bundled with E-mu, ESI-32, E-64, EIV, and CD-ROM drives.
Format: Audio, Ensoniq, Akai, Roland, E-mu, Kurzweil, Digidesign SampleCell on CD and CD-ROM.
Licensing: Royalty-free buyout. All CDs and samples are license free upon registration.

istration.
Cost: Varies.
Reader Service #175

Janus Interactive
1600 NW 167th Pl., Ste. 320
Beaverton, OR 97006
800.526.8739
503.629.0587
503.690.6690 FAX
oca@janusinteractive.com
http://www.janusinteractive.com
Sampled instruments, sound effects, phrases/loops, MIDI files: Six-disc set of 5,000 digitally recorded sounds, including vehicles, weather, household, industry, and animals. Interface includes a custom playlist, searching, and batch conversions.
Format: WAV, AIFF on CD-ROM.
Licensing: Royalty-free buyout.
Cost: $699.
Reader Service #176

Jasmine Multimedia Publ.
6746 Valijean Ave.
Van Nuys, CA 91406
818.780.3344
818.780.8705 FAX
Reader Service #177

Keyfax
P.O. Box 958
Aptos, CA 95001-0958
408.688.4505
408.689.1012 FAX
102045.3065@compuserve.com
Phrases/loops, MIDI files: Twiddly Bits — MIDI sequences of musical parts played by real musicians on real (MIDI) instruments. Volumes include General Instruments, Gate Effects, Electric & Acoustic Guitar, Drums and Percussion, Country, Brazilian Beats, Funk, and a Master Series — John "Rabbit" Bundrick Classic Rock & Country Piano. Each disk has 400-800 files.
Format: Standard MIDI Files provided on 3.5-inch floppy for Mac or PC.
Licensing: Royalty-free buyout. Additional licensing needed on the Brazilian Rhythms collection if it is re-used in MIDI file form.
Cost: Varies.
Reader Service #178

Killer Tracks
6534 Sunset Blvd.
Hollywood, CA 90028
800.877.0078
213.957.4455
213.957.4470 FAX
Reader Service #179

Kurzweil
13336 Alondra Blvd.
Cerritos, CA 90703
310.926-3200
310.404.0748 FAX
Reader Service #180

Latino Sequences
5011 SW 139 Pl.
Miami, FL 33175
305.559.9102
305.559.9102 FAX
75254.3200.compuserve.com
MIDI files: Merengue, Salsa, Bachata, Son Montuno, Soca, Bolero, etc. Average file size: 70kB.
Format: Standard MIDI Files Type 1 and Type 0 on 3.5 floppy disk for PC.
Licensing: Royalty-free buyout. Programmer's name and Latino Sequences company name must appear in the final product.
Cost: $30 for two disks; $12.95 for three to five; $10 for more than five.
Reader Service #181

Lavskymusic
16 E. 42nd St.
New York, NY 10017
212.697.9800
212.983.3609 FAX
Reader Service #182

L.B. Music Technologies
51 Charter Oak Dr.
Newtown Square, PA 19073
800.352.6874
610.356.6737 FAX
76255.3713@compuserve.com
MIDI files: For computers and digital pianos in 24-song Power-Paks. Also available per song.
Format: General MIDI, Korg 01/W, Ensoniq TS-10 on 3.5-inch disk.
Cost: $49.95.
Reader Service #183

Leonardo Software
12421 W. Olympic Blvd.
Los Angeles, CA 90064
310.820.2868
310.820.5753 FAX
Sound effects: CDs from 30 different libraries (two-CD sets to 70-CD sets).
Format: Audio CD.
Cost: Flat fee.
Reader Service #184

Liebert Recording Studios
16 W. 46th St.
New York, NY 10036
212.840.1350
212.764.0440 FAX
Sampled instruments, sound effects, and music: All styles of stock music and synthetic music, extensive library of classical and international ethnic music.
Format: Analog audio, DAT, Ensoniq, digital video (D-2 and D-3), and APT-X (3D2 File).
Licensing: Negotiable, based on parameters of project.
Cost: Per use basis ($35-$10,000).
Reader Service #185

Manchester Music Library
6 Halfmile Rd.

Norwalk, CT 06851
203.846.3745
203.846.0267 FAX
Fully produced music: Music for broadcast and nonbroadcast, 80 cuts per CD. Sold individually and as collection.
Format: Audio CD.
Licensing: Cannot copy or resell.
Cost: Varies.
Reader Service #186

Manhattan Production Music
355 W. 52nd St., 6th Fl.
New York, NY 10019
800.227.1954
212.333.5766
212.262.0814 FAX
Sound effects and fully produced music: 60 CDs, each with an average 12 full-length themes ranging from two minutes to 10 minutes in every musical genre. Each cue has 60-second, 30-second, and 10-second versions.
File format: Audio CD.
Licensing: Blanket or per production.
Cost: Varies.
Reader Service #187

Mays Midi Productions
9294 S.R. 44 Lot O
Mantua, OH 44255
216.274.2797
Phrases/loops, fully produced music, MIDI files: Drum sequences and background music — 45 three-minute drum sequences and background music in categories such as corporate, uptempo, blues, rock, country, new age, music beds, intros, and effects.
Format: General MIDI and WAV files on 3.5-inch floppy disks for the PC.
Licensing: Royalty free buyout.
Cost: Varies.
Reader Service #188

Metro Music Productions
37 West 20th St.
New York, NY 10011
212.799.1700
212.229.9063
metromp@aol.com
Fully produced music: Contemporary production music ranging from urban, rock, and jazz to orchestral, world, and drama. Each cut includes a full-length version (two to three minutes) and 60-second, 30-second, and 10-second versions. Custom music also available.
Format: Audio CD (others available upon request).
Licensing: Annual lease, per production, or per clip (buyout not available).
Cost: Varies based on type of product and quantity produced.
Reader Service #189

MIAMIDI Multi-Media
Box 610968

N. Miami, FL 33261-0968
305.892.6434
305.892.8408 FAX
Fully produced music, MIDI files: All styles.
Format: CD and floppy disk.
Cost: $5-$500.
Reader Service #190

MIDI Classics
Box 311
Weatogue, CT 06089-0311
800.787.6434
860.651.1349 FAX
mcsales@midi-classics.com
MIDI files: Classical guitar, guitar, and other instruments; Urtext transcriptions from beginner studies to virtuoso. More than 500 complete pieces — some sold individually, some in collections of more than 100.
Format: Twelve Tone Systems Cakewalk; Standard MIDI files for PC, Atari, and Mac; and proprietary MIDI formats for popular dedicated sequencers and keyboards. Files come on 3.5-inch and 5.25-inch floppy disks or downloaded from the Internet.
Licensing: Licensed for personal use. Additional licensing agreement/fee for commercial use.
Cost: From $9.95.
Reader Service #191

MIDI Mania
Box 381
Pilot Rock, OR 97868
503.443.6434
MIDI files: Synthesizer patches for Roland JV1080 and XP50. Each disc has 128 patches.
Format: Standard MIDI Files and Kawai Q-80EX on 3.5-inch floppy disk.
Cost: $39.95 (single disc), $59.95 (two discs).
Reader Service #192

MIDI Mark Productions
Box 217
Whitier, CA 90608
800.301.6434
310.699.0095
310.699.0864 FAX
Sampled instruments, sound effects, fully produced music: *Vocal Bytes* — two volumes of vocal samples. *Dance Construction Set* — drum loops including dance, hiphop, techno. *Powerhouse* — more than 1,000 instrument samples. 1,000 sounds per CD; 300MB per CD-ROM.
Format: Audio, Ensoniq on 3.5-inch floppy and CD-ROM
Licensing: Varies.
Cost: $75-$299.
Reader Service #193

The Music Bakery
7522 Campbell Rd., Ste. 113-2

Dallas, TX 75248
800.229.0313
214.414.0313
214.414.3160 FAX
http://www.computek.net/musicbakery
Sound effects, fully produced music: Music in all styles by professional studio musicians. Each CD has 50 clips, 70 minutes of music in five-second to five-minute cuts.
Format: Audio CD.
Licensing: Royalty-free buyout for non-broadcast use.
Cost: $48 per CD.
Reader Service #194

Musicraft Studio
Box 1272
Laurel, MD 20723
301.604.6297
301.604.6297 FAX
MIDI files: Jazz Combo — small ensemble improvised jazz standards. Piano, bass, rhythm, solo horn, etc.
Format: Standard MIDI Files Type 1 or 0 (can also supply Twelve Tone Systems Cakewalk WRK files), all GM/GS, on 3.5-inch floppy disk.
Cost: $6.50 per song, minimum order of five (collections specially priced).
Reader Service #195

Musicrafters
Box 595
Montgomeryville, PA 18936
800.468.8863
215.368.8863
215.368.7488 FAX
Fully produced music: Acoustic and electronic production music in various styles. 30-second and 60-second lengths and cuts up to 4.5 minutes long.
Format: Audio CD.
Licensing: Royalty-free buyout for background or feature use in any media except feature films (by special license only).
Cost: $24.95-$49.
Reader Service #196

National Archives and Records Administration
Motion Picture, Sound, and Video Branch
8601 Adelphi Rd.
College Park, MD 20740-6001
301.713.7060
301.713.6904 FAX
mopix@nara.gov
Documentary audio: U.S. government and privately produced sound recordings. Radio broadcasts, speeches, interviews, documentaries, oral history, public information programs, NASA audio collection, Supreme Court oral argument collection, etc.
Format: Analog audio tape.
Licensing: Most material is in the public domain, some is restricted.

Cost: Varies.
Reader Service #197

National Sound
460 W. 42nd St.
New York, NY 10036
212.564.3434
212.947.0863 FAX
Sound effects, fully produced music: Entire range of styles selected from a collection of 18 music libraries, totalling 1,000s of CDs.
Format: DAT.
Licensing: Per use, based on number of units sold.
Cost: Varies.
Reader Service #198

Network Music
15150 Ave. of Science
San Diego, CA 92128
619.451.6400
619.451.6409 FAX
Sound effects, fully produced music: *Professional Library* —1,200 original compositions from classical to high-tech styles, 6,000 sound effects, and 1,000 production elements. Each CD has eight to 10 clips; includes a three- to four-minute version, 59-second, 29-second, and short-tag version of each clip. Includes Trakfinder CD-ROM catalog and audition programs. *Presentation Audio* — CD-ROM library designed and formatted for use with presentation authoring programs. Includes 30 music clips (60-second, 30-second, and tag versions), 100 sound effects, and 100 production elements.
Format: *Professional Library* —Audio CD. *Presentation Audio* — WAV, AD-PCM Compressed WAV for Win 3.1 or Win95.
Licensing: *Professional Library* —Annual and per production. *Presentation Audio* — Royalty free for use in non-broadcast, computer-based presentations.
Cost: *Professional Library* —Varies. *Presentation Audio* — $49.95 each/ $199.95 for five-volume set.
Reader Service #199

Norton Music
Box 13149
Fort Pierce, FL 34979-3149
407.467.2420
407.467.2420 FAX
notesnortn@aol.com
MIDI files: Band-In-A-Box User Styles (30 styles per disk), Band-In-A-Box Fake Disks (over 300 songs per disk), General MIDI sequences — all types of music (10 sequences per disk).
Format: MIDI, STY, SG* on Atari, PC, and Mac floppy disks.
Licensing: Royalty-free buyout.
Cost: From $25.
Reader Service #200

OGM Production Music
6922 Hollywood Blvd., Ste. 718
Hollywood, CA 90028
800.421.4163
213.461.2701
213.461.1543 FAX
ogmmusic@ogmmusic.com
http://www.ogmmusic.com
Fully produced music: Red Line — Contemporary ranging from rock, new age, country to updated Latin and dance music. Blue Line — Hi-Tech, acoustic and electronic contemporary theme sets. Purple Line — Specialized, including drama solo instruments, comedy, marches, travel, special occasions, musical effects, and tags. Green Line — Classical full symphony, overtures, operas, ballets, small chamber ensembles. Gold Line — Various jazz eras, big bands, western, ethnic music, satire/comedy. Orange Line — Archives, music from past 30 years.
Format: Audio CD.
Licensing: Varies.
Cost: Varies.
Reader Service #201

Omnimusic
6255 Sunset Blvd., Ste. 803
Hollywood, CA 92647
213.962.6494
213.962.4556 FAX
Sound effects and fully produced music: Production music library covering a variety of styles.
Format: Audio CD.
Licensing: Negotiable.
Cost: Varies.
Reader Service #202

On Point Productions
61 Superior St.
Port Jefferson Station, NY 11776
800.331.8841
516.473.4383 FAX
Reader Service #203

OSC
480 Potrero Ave.
San Francisco, CA 94110
800.343.3325
415.252.0460
415.252.0560 FAX
sales@oscmail.com
Sampled instruments, sound effects, phrases/loops: Alternative sound libraries in anthologies and theme-based disks. More than 1,000 individual samples per disk.
Format: Mac CD-ROMs with 16-bit AIFF or SDII (Audio CD versions ship early '96, mono and stereo, 44.1kHz)
Licensing: Royalty-free buyout.
Cost: $149 per disk.
Reader Service #204

Patco Resources
9 Washington Cir.

Suffern, NY 10901
914.357.5300
914.357.6427 FAX
Fully produced music: Classical music — compositions of any length can be provided. Also research and license popular music.
Format: DAT, open-reel analog tape, or audio cassette.
Licensing: Negotiable.
Cost: Varies.
Reader Service #205

Pisces Music
342 Madison Ave.
New York, NY 10017
212.682.1860
Reader Service #206

Porter Moore Music
19 Blue Ridge Trail
Rochester, NY 14624
716.429.7099
jbrownis@aol.com
MIDI files: Classical keyboard music ranging from J.S. Bach to Shostakovich (complete pieces). File sizes range from 10kB to 100kB. MIDI monthly "magazine" contains a MIDI "album," liner notes, and musical puzzles.
Format: Standard MIDI Files on 3.5-inch floppy disks (PC) and audio tapes on standard cassettes.
Licensing: Royalty-free buyout.
Cost: Varies.
Reader Service #207

Production Garden Library
4766 Research Dr.
San Antonio, TX 78240
800.247.5317
210.641.7455 FAX
Reader Service #208

Promusic
941-A Clint Moore Rd.
Boca Raton, FL 33487
800.322.7879
407.995.0331
407.995.0984
promuse@aol.com
Sound effects, fully produced music: 1,500 CDs of diverse styles. Average 72 minutes per CD.
Format: Audio CD.
Licensing: Needle drop, production blanket, or annual license. Sound effects on royalty-free buyout.
Cost: Varies.
Reader Service #209

Pro-Rec
106 W. 13th St., Ste. 13
New York, NY 10011
212.675.5606
212.627.3148 FAX
prorec1@aol.com
Sampled instruments: Ready-to-play synth sounds for all major synths and samplers on soundcard and floppy disk, sample disks, sampling CDs and CD-ROMs. Large library on each CD and CD-ROM, full banks on sound cards or sample disks.
Format: Audio CD, various proprietary synth formats, AIFF, Digidesign SampleCell Mac and PC, Maui, WAV, AWE32, Akai, ESI-32, E-III/IV, EPS/16+, ASR-10.
Licensing: Royalty-free buyout.
Cost: Varies.
Reader Service #210

Q Up Arts
Box 1078
Aptos, CA 95001-1078
408.688.9524
408.662.8172 FAX
Reader Service #211

QCCS Productions (PBTM Music)
1350 Chambers St.
Eugene, OR 97402
503.345.0212
503.345.8117 FAX
Fully produced music: CD music library (17 volumes) of professional production music in a wide variety of styles. Approximately one hour of music per disc.
Format: Audio CD.
Licensing: Royalty-free buyout. End user license with no restrictions other than selling the music as music only.
Cost: $69 per CD.
Reader Service #212

River City Sound Productions
Box 750786
Memphis, TN 38175
800.755.8729
901.274.7277
Fully produced music: Broadcast Series — variety of music in categories such as sports, mellow, broadcast, country, rock, hi-tech, atmospheric, urban, misc. In song length, 60-second, 30-second, 15-second, and 10-second edits. Specialty Series — discs dedicated to specific moods such as weddings, nature, country, corporate/industrial, mellow moods, Christmas.
File format: Audio CD.
Licensing: Royalty-free buyout. Must be part of a total production — cannot be re-released as a competitive music library.
Cost: $59 per CD.
Reader Service #213

Roland
7200 Dominion Circle
Los Angeles, CA 90040
213.685.5141
213.722.0911 FAX
Reader Service #214

Rubber Chicken Software
Box 100
Willmar, MN 56201
800.877.6377
612.235.9798
612.235.9798 FAX
Sampled instruments: Samples for Ensoniq samplers (EPS, 16-Plus, and ASR-10). Samples include synths, organ, piano, vintage keyboards, electric and acoustic guitars, bass, rhythm and dance loops, country instruments, Renaissance/Medieval instruments, acoustic instruments.
Format: Ensoniq on floppy disk, hard drive carts, and CD-ROM.
Licensing: Royalty-free buyout.
Cost: $9.95-$199.95.
Reader Service #215

Sampleheads
276 Riverside Dr.
New York, NY 10025
212.866.1533
212.678.2577 FAX
info@sampleheads.com
http://www.sampleheads.com
Sampled instruments, phrases/loops: Six sound libraries, each with its own focus: The Will Lee Bass Library, Peter Erskine Living Drums, New York City Drumworks, New York City Percussionworks, 'Whole Lotta Country, and Will Lee: Ultra Freakin' Bass. Range of styles from funk to jazz to country to hiphop to rock to swing. Each library family focuses on one primary style.
Format: Audio CD; Akai, Roland, Digidesign SampleCell (AIFF/SDII/Mac) CD-ROM
Licensing: Royalty-free buyout. 100% copyright and license free. For use in music production. Not to be repackaged and sold in other sampling collections.
Cost: Varies.
Reader Service #216

Showcase Professional Studios
Box 19433
Cleveland, OH 44119
216.481.1161
sxp17@po.cwru.edu
Sampled instruments, sound effects, phrases/loops, fully produced music, and MIDI files: Public domain Standard MIDI Files, patches, and samples from all over the world; music-related software. Samples may be chosen individually.
Format: Kurzweil, Ensoniq, Mac, PC, Atari, WAV, SDS on 3.5-inch floppies.. Upcoming CD-ROM will support Mac, PC, Atari. ZIP and EZ135 removables for PC, Atari, Kurzweil, and Ensoniq.
Licensing: Royalty-free buyout.

Cost: Flat fee ($3-$5 per disk).
Reader Service #217

Signature Music Library
Box 921
Chesterton, IN 46304
800.888.7151
219.921.0205
219.921.0704 FAX
Sound effects, fully produced music: 40 CDs in styles such as acton, corporate, motivational, contemporary jazz, Americana/country, new age, classical, children, hi-tech, etc. Each CD has 15-20 cuts of full-length themes (two-five minutes).
Format: Audio CD.
Licensing: One-time payment for lifetime license, annual blanket license, or per use.
Cost: Varies.
Reader Service #218

Sopersound Music Library
657 Cowper St.
Palo Alto, Ca 94301
800.227.9980
415.321.4022
Reader Service #219

Sound Concepts
943 Manhattan Beach Blvd., Ste. C
Manhattan Beach, CA 90266
310.796.0424
310.796.0424 FAX
Sound effects, phrases/loops, fully produced music: Custom sound effect creation and optimization for multimedia.
Format: Audio, AIFF, WAV, AVI, MOV, QuickTime delivered on CD, floppy, CD-ROM, DAT.
Licensing: Royalty-free buyout.
Cost: Varies.
Reader Service #220

Sound Ideas
106 W. Beaver Creek Rd., Ste. 4
Richmond Hill, Ontario, L4B 1C6
Canada
800.387.3030 (USA)
800.665.3000 (Canada)
905.886.5000
905.886.6800 FAX
sfx2@sound-ideas.com
Sound effects: Extensive collection of sound effects including *SFX on CD-ROM, Volume 1* — 300 digitally recorded sound effects for multimedia PC apps. Effects include animals, comedy, vehicles, guns and explosions, weather. *SFX on CD-ROM, Volume 2* — 1,000 digitally recorded sound effects and music files for multimedia PC apps. Both operate on Windows 3.0 with Multimedia Extension 1.0, Windows 3.1, or Windows 95. Search program included.
Format: Volume 1 — WAV

(22.05kHz, 8-bit and 16-bit mono and stereo) and Audio CD. Volume 2 — WAV (22.05kHz, 8-bit mono and 16-bit stereo)
Cost: $29.95 per disc.
Reader Service #221

Sound Patrol
6 E. 39th St.
New York, NY 10016
212.213.6666
212.213.6677 FAX
Sound effects, phrases/loops, fully produced music, MIDI files: All styles from classical to rock.
Format: AIFF, on 1/4-inch tape, DAT, Iomega Zip drive.
Licensing: Needle drop (per clip) and production blanket licenses.
Cost: Varies.
Reader Service #222

Sound Source Interactive
2985 E. Hillcrest Dr., Ste. A
Westlake Village, CA 91362
805.494.9996
805.495.0016 FAX
Reader Service #223

SP Productions/Techsonics
709 Shadowfield Ct.
Chesapeake, VA 23320
804.547.4000
804.366.0919 FAX
Reader Service #224

Sweetsong Productions
Rt. 9, Box 332-A
Parkersburg, WV 26102
304.428.7773
Fully produced music: Eight CDs with six cuts per CD in full-length (three to four minutes), 60-second, 30-second, and three to six different mix versions. Collection of 25 stingers on CD.
Format: Audio, delivered on CD, cassette, or 1/4-inch tape.
Licensing: Royalty free buyout.
Cost: $375 (Production Library, eight CDs), $195 (Stingers).
Reader Service #225

Synclavier
Rivermill Complex
Lebanon, NH 03766
603.448.8887
603.448.6350 FAX
Reader Service #226

TM Century
14444 Beltwood Pkwy.
Dallas, TX 75244
214.406.6800
214.406.6890 FAX
Reader Service #227

Trackbusters
Box 20279
Myrtle Beach, SC 29575

800.844.4785
803.293.2589 FAX
76300.2411@compuserve.com
Fully produced music, MIDI files: MIDI sequences in all styles, specializing in current country. (Also sell portable turnkey MIDI sequencing systems.)
Format: GM, GS, WAV, Standard MIDI File Types 1 and 0, DAT, cassette, several popular workstations. On floppy or CD-ROM.
Cost: Varies.
Reader Service #228

Tran Tracks
350 Fifth Ave., Ste. 3304
New York, NY 10118
201.383.6691
201.383.0797 FAX
MIDI files: Exact duplications of popular songs in all styles of music.
Format: Most formats available, including General MIDI. Licensed individually or in collection.
Licensing: Each use other than in performance is an individual license.
Cost: Varies.
Reader Service #229

TRF Production Music Libraries
747 Chestnut Ridge Rd.
Chestnut Ridge, NY 10977
800.899.6874
914.356.0800
914.356.0895
Sound effects, fully produced music: More than 50,000 selections (4,000 discs) of production music. Classical and sound effects collections. Average of 75 minutes of music per CD.
Format: Audio CD, LP, or DAT.
Licensing: Blanket or per-use (flexible terms).
Cost: Varies.
Reader Service #230

Trycho Music
2166 W. Broadway St., Ste. 303
Anaheim, CA 92804
800.543.8988
909.696.3577
909.696.3571 FAX
Fully produced music, MIDI files: Trycho Tunes performance sequences, "Tunes To Go" audio library.
Format: Audio, MIDI, WAV on floppy disks, CD-ROM, cassette, DAT.
Licensing: Varies. May require music publisher license.
Cost: Varies.
Reader Service #231

Tune 1000
7710 Hamel Blvd. W.
Ste-Foy, Quebec G2G 2J5
Canada
800.363.8863
418.877.8900

418.877.9994 FAX
MIDI files: More than 75 albums, each with an average of 10 songs.
Format: Standard MIDI Files with lyrics (Karaoke Type 0, .MID) on floppy disk.
Licensing: Varies.
Cost: $24.95 per album.
Reader Service #232

Valentino Music and Sound Effects
500 Executive Blvd.
Elmsford, NY 10523
800.223.6278
914.347.7878
914.347.4764 FAX
tvmusic@ibm.net
Sound effects, fully produced music: More than 150 CDs in both collections. Free catalog and demo on request.
Format: Audio CD, DAT, CD-ROM.
Licensing: Varies.
Cost: Varies.
Reader Service #233

Voyetra Technologies
5 Odell Plaza
Yonkers, NY 10701
800.233.9377
914.966.0600
914.966.1102 FAX
info@voyetra.com
Sound effects, phrases/loops, fully produced music, MIDI files: Music Gallery —35 digital audio tracks in three-second, 30-second, full-length segments; 400 full-length MIDI files; 50 drum arrangements; 300 sound effects.
Format: WAV, MIDI on CD-ROM (PC, Windows 3.1 or higher, 386SX or higher microprocessor, 4MB RAM, soundcard required).
Licensing: Varies.
Cost: $49.95 per CD-ROM.
Reader Service #234

Wayzata Technology
21 NE 4th St.
Grand Rapids, MN 55744
800.735.7321
218.326.0597
218.326.0598 FAX
wayzatatec@aol.com
Sampled instruments, sound effects, phrases/loops, fully produced music: Sound Library Pro — 1,200 digitally recorded sounds including animals, household, instruments, nature, special effects, and voice in 5-second to 10-second lengths. Available in 8 bit, 22kHz and 11kHz. Sound Library 2000 — 2,000 8-bit 22kHz sounds including animals, household, musical instruments, sounds of nature, planes, trains, and automobiles, beeps, people, short phrases, misc. special effects in five-second to 10-second lengths. MusicScapes Profes-

sional — Sixteen tracks (almost 30 minutes of music) from mellow clarinet to wicked rock. Music is 16-bit stereo. MultiMedia Trax! — Twenty songs in styles including TV/commercial, drama, techno, rock and roll, nature, and funk. Clips are 30 seconds to four minutes.
Format: Sound Library Pro — WAV, AIFF on CD-ROM. Sound Library 2000 — AIFF on CD-ROM for Mac, Windows, and Win95. MusicScapes Professional and MultiMedia Trax! —WAV, AIFF on CD-ROM for Mac, Windows, and Win95.
Licensing: Royalty-free buyout.
Cost: Sound Library Pro and Sound Library 2000 — $25 per disc. MusicScapes Professional and MultiMedia Trax! — $39 per disc.
Reader Service #235

W.D. Coakley
913 Fifth Ave. S.
Lake Worth, FL 33460
800.742.6625
407.582.7709
407.547.8205 FAX
WDCo@aol.com
Sampled instruments: Perfect Piano Series Volumes I and II, Perfect Percussion Volume 1.
Format: Akai, Kurzweil, SampleCell II, E-mu, Ensoniq, Roland on CD-ROM.
Cost: $299.
Reader Service #236

The Well-Tempered Music Library
Box 465
Middleborough, MA 02346-0465
617.354.7012
617.876.1646 FAX
Fully produced music: 425 music selections on seven CDs in categories such as commercial, classical, character, human tech, extended beds, and alternate mixes.
Format: Audio CD
Licensing: Royalty-free buyout.
Cost: $299.
Reader Service #237

Wolfetone
1010 Huntcliff, Ste. 1350
Atlanta, GA 30350
707.552.7584
707.992.7500 FAX
blueboy@mindspring.com
Phrases/loops, fully produced music, MIDI files: Contemporary backgrounds including 34 clips and seven fanfares in all formats.
Format: Audio CD; WAV, Standard MIDI Files Type 0 and Type 1, VOC on CD-ROM.
Licensing: Royalty-free buyout.
Cost: $89.95.
Reader Service #238

Don't Be a Video Blockhead

Simulating Anti-Aliased Sprites

BY CHRIS MEYER

W hy do images in interactive titles often look so different from images in "real" video or film? One difference is that moving objects captured on video or film retain their smooth edges, while objects composited and animated in programs such as Macromedia Director often have blocky or staircased edges. This effect is a result of the limitations of current technology, specifically screen resolution and computer horsepower. Fortunately, there's a workaround that can fake the smooth look in some cases.

The Art of Compromise

A number of image processing programs deal with staircased edges via a technique known as anti-aliasing. This defines the color of each pixel along an edge (i.e., the outline of a composited object) as a blend of colors on either side.

Anti-aliasing is a compromise that goes along with pixel resolution inadequate to represent a given image. Think of an image as a grid of pixels, usually squares like those on a piece of graph paper. Each square has a single color. To draw the outline of an object, you must change the color of the pixels that lie along it.

Unfortunately, the lines and outlines you need to represent usually don't fall on the center of every pixel they touch. Often they touch only a corner of a pixel or straddle more than one as they pass.

To see what you're up against, take a crayon or marker with a thick point and draw any line or shape on a piece of graph paper. Unless you draw perfectly straight lines that go right up the middle of the rows and the columns of boxes, you'll find that many boxes are only partially covered by your drawing. If you use a finer point to fill all of them in precisely, the result will be a jagged aliased image. You might reduce the effect somewhat by using graph paper with a finer grid (higher resolution, i.e., more pixels, more dots per inch, and the like), but this isn't an option when images must be displayed on a fixed-resolution screen.

Since a pixel can contain only one color, finding a color in between those of the object outline and background seems a good solution. Anti-aliasing averages the colors that surround a given pixel and fills it with this average color. For example, if you draw a black line on a white background and the line covers only half of a particular pixel, this pixel would be filled with 50% gray. Load a photograph into an image processing program such as Adobe Photoshop and zoom in on it. You'll see these compromised color boxes and how the colors are compromised along the edges of a line, shape, or sharp transition.

Anti-aliasing is also useful for representing transparency. That is, even though a line or shape may cover a pixel completely, you may not want it to be entirely opaque. This would apply if you were viewing a background through smoke or fire. You may want edges to be semi-transparent or "soft" to simulate light bending around them (as in the familiar lens flare effect), an out-of-focus camera, or blurring caused by fast motion. In all these cases the same principle applies: The color of each relevant pixel in the foreground image is factored by its opacity value, then combined with the color of the image behind it.

Compositing vs. Blitting

The shapes of real-world objects seldom fall exactly in line with the pixel grid of a computer screen, especially when they're in motion, and occasionally they have some degree of transparency. Consequently, when you're compositing images for video or animation, anti-aliasing is more or less necessary for a realistic look.

Anti-aliasing information is usually defined in the alpha channel layer that describes the transparency of each pixel. (A detailed discussion of alpha channels appears in the September/October '95 installment of this column.) Most pro-level animation and image compositing programs intended for noninteractive applications can perform this anti-aliasing and provide a nicely compromised grid of pixels (i.e., individual image or frame). It's a fairly easy task for such programs because the calculations can be performed out of real time.

However, many interactive situations require anti-aliasing on the fly, for instance when a foreground image moves over a background in response to user input. In rare cases, you may be able to pre-composite every possible combination of foreground objects and background images and display them at the appropriate moments, but most of the time this isn't practical — and even when it is, you may not have the computer horsepower or delivery bandwidth to update every pixel with each frame of animation. Instead, interactive animation programs conserve horsepower and bandwidth by redrawing only the moving objects themselves. These objects are called *sprites*, and the technique of redrawing only the pixels associated with them is referred to as *blitting*.

Relatively little horsepower is required merely to copy the pixels of a sprite over those of a background. But it does take horsepower to look at the alpha channel associated with a moving object to determine which pixels need to be anti-aliased, find their colors, find the colors of the pixels in the background that they're covering, calculate the proper blends, and draw the compromise pixels in the proper places on the fly. That's why the moving objects in so many interactive animations have blocky, aliased edges.

As I said, there's a workaround (though it only works in some situations). The trick is to calculate the anti-aliasing ahead of time to liberate the computer from having to do it on the fly.

Go Forth and Pre-Multiply

Our goal is to create objects whose edges are anti-aliased with respect to the background over which we expect them to appear. At the same time, each object's alpha channel (or other transparency definition) should have no anti-aliased edges and therefore no transparency to calculate as the object is blitted.

The restriction is knowing ahead of time what portions of the background an object will pass

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over. If the potential paths are entirely unpredictable, all is not lost — read on — but the results will be better if you know the various ways the object is likely to travel. In interactive applications, situations often occur in which the user must choose among a limited set of choices. In these cases you may be able to anticipate the potential paths an object may take across a background image.

First, make sure each object to be animated is indeed defined with anti-aliased edges or masked by an alpha channel that has anti-aliased edges. This can be accomplished by chroma keying out the background, cutting out the object in an application like Photoshop, or starting with a synthetic image that was rendered with an alpha channel. Next, composite it against the background and animate it along the paths you anticipate. In doing so, the colors along the object's outline will average with whatever colors it touches. In effect, you have *pre-multiplied* the edges of the object with the background. (Pre-multiplied means any color averaging that takes place is present in the RGB image rather than in the alpha channel alone; again, see the September/October '95 column for more details.) Note that you haven't created a non-anti-aliased alpha channel for the sprite itself — yet.

How do you accomplish this? One approach is to take the composited scene, overlay it on the original background image, and use a *difference matte* to drop out the background. A difference matte compares two images and drops out identical pixels within a certain tolerance. Use a very low tolerance in this case. For one thing, the background is an exact match, so dropping it out shouldn't be a problem. More important, you don't want the newly anti-aliased edges to drop out accidentally, or for anti-aliased edges to be created in the new alpha. Remember, we're trying to create a new alpha channel with no anti-aliasing in it — either 100% white or 100% black — and to retain all of the sprite's anti-aliased pixels.

Next, output the result in a format compatible with your interactive animation program. A normal alpha channel, even one that contains 100% white or black pixels, often isn't supported; but when it's not, transparency usually is defined some other way. Director, for example, offers the option to treat any 100% white pixel as transparent. If you're animating in Director, composite the difference-matted image over a solid 100% white background. If you're using another program, you'll need to look in the manual under "transparency" to learn how to handle this.

In your interactive program, set up the same background and overlay your sprites. As long as they move along the predetermined paths, their edges will look beautiful.

As I said, you must determine every potential sprite/background combination ahead of time for this to work (or else the pre-multiplied edges won't match the background). You can still vary speed and direction interactively, as long as the objects keep to their appointed rounds.

Blurring the Line

There are a couple of safety hatches if you require completely unpredictable animation: The simplest is to make the background a single solid color. Then the sprites can move freely and the background pixels they encounter will always be the same color. Some animators get acceptable results by creating a solid background that is the average color of the scene they intend to animate against (usually created by massively blurring the original background image), matting against that to generate pre-multiplied edges, and then animating freely over the actual background.

You can't expect this technique to make the edges look perfect. But they'll be a lot less blocky than if they had been pre-multiplied with black or white, and certainly better than if you don't go out of your way at all.

If you use these techniques, your animations will look more like "real video" (with good looking edges and compositing) than like low-powered computer animations. Note that because this technique handles partial transparencies as well, you can spice up your sprites with effects such as motion blur to better represent natural movement, especially at a reduced frame rate.

Eventually, all interactive delivery platforms will have the horsepower and bandwidth to deliver visual quality comparable with normal video or film. But until they do, this pre-multiplication technique is a pretty good cheat.

Special thanks to Jerry Witt of Motion City Films and Trish Meyer of CyberMotion for these techniques. The images that appear in this article are from the Aris Enterprises World View *and* Classic Nostalgic Memorabilia Photographic Image Objects Collection Vol. 1 *CD-ROMs.* �
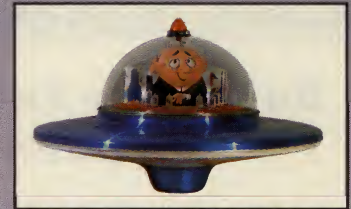

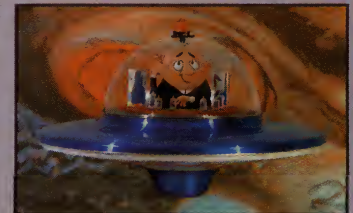Figure 1. Our object to animate and composite. Notice the partial transparency in the spaceship's bubble.

Figure 2. The spaceship composited over a planet. Notice how the planet is partially visible through the spaceship's bubble. This is the point at which you animate your object.

Figure 3. The composited planet and spaceship are now matted over the planet by itself, using a difference matte applied in Adobe After Effects (parameters: Matching Tolerance = 0%, Matching Softness = 0%, Choke Matte = 0.00). Notice how the planet drops out around the spaceship but remains visible through the bubble.

Figure 4.

Figure 4a.

Figure 4. The cut-out object is composited over a 100% white background for Director to key out. Notice in Figure 4a (zoomed in 400%) the jagged edges with tinges of red from the planet, and the planet is still visible through the bubble; when blitted over the planet using the same animation path as when originally compositing, these edges will appear anti-aliased and smooth, and the image inside the bubble will match the background.

Software Interaction Device Characteristics: A Functional Anatomy

(And a Brainstorming Tool for Interface Development)

BY   ERIC   JUSTIN   GOULD

When developing interfaces, try an interface brainstorming tool. It brings together many important characteristics of software user interface devices and interaction techniques to help you evaluate alternatives during the design process. By focusing on individual interactions, one aspect at a time, you'll find it easier to create variations on a particular design.

This gives you the opportunity to check each alternative for how well it suits the overall feel of your product, so the messages you want to communicate come through equally strong from the media content, the architecture that holds it, and the interactions you employ. Also, it's an easy way to show a breadth of possibilities to a client. And once you arrive at a final design for any particular interaction, you will be able to communicate clear functional specifications to your engineering staff that leave little room for ambiguity or misunderstanding.

At MONKEYmedia, we've found this tool useful for uncovering options we may have overlooked. It isn't meant to provide an exhaustive set of options, but to act as a catalyst for the creative process. It's a worksheet that lays out all the interaction variables to consider when designing an individual interface element. To use it, photocopy a stack of blank worksheets. On one page, circle the characteristics that define one option for a design you're working on. Once you have the sheet filled in, on subsequent pages change one or more variables and note the impact on the entire interaction. For a start, take a look at the example worksheet for a standard OK button (see page 80).

The vertical layout of the chart is fairly arbitrary — an attempt to compress it into a small space

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with as few redundancies as possible. (Nonetheless, a few repetitions of variables do remain, as it is necessary to differentiate within terminal vectors that don't connect.) Start anywhere you want and follow any available path — there is no beginning or end, and what may look like vertical columns of continuity aren't necessarily. If you find you can't select an option in every category, simply fill in the ones you can and work upward and downward; in some cases you won't have a choice, so the options will select themselves.

For instance, if you know your interface won't use a visible cursor (circle the "Invisible" option in the category "Control Device Controller"), then you won't be able to place a controller in a particular screen location (there is no line in the chart leading from "Invisible" to "Position"). Consequently, you'll need to calculate control of the media from changes in mouse position activated by the force of the participant's hand (the line from "Invisible" leads directly to "Force"), rather than by changes in the absolute cursor position.

Note that I use the words *controller* and *device* such that controllers act on control devices that act on media content. I use these words hesitantly because they sound so academic and product(ivity) oriented. However, in this context they're abstract enough to apply to a variety of situations. See Fig. 1 for a concrete depiction of these terms.

Below you'll find definitions for each category on the worksheet, attributes of the various choices within each category, and examples of real-world software interaction devices that demonstrate each type. In your design process, remember to attend to the sensuality of each interaction, be sure that the runtime environment of all your target platforms can support the immediacy of feedback your style demands, and test your beautiful, brilliant creations on people.

Affordance: An affordance lets the participant know what is possible to do, or where to look to find out. It can be a literally *ever present* control such as a button to press, or it can be *ambient audio or video* that draws attention to an area of the media space that can be acted upon (such as a page corner), or where a controller pops up to be used (such as a slider that remains hidden when not in use). Another example is the little momentary sparkle that Human Code uses on its products (such as *The Cartoon History of the Universe*) to indicate that screen elements can be clicked.

Device Activation: A device can be activated by *pressing* on a specified area, by *clicking* once or a number of times, or by *rolling into proximity* of it.

Device Use: A device can be used with either the mouse *button up* or *down*. You might enable a person to continuously browse media over long durations by making it unnecessary to hold the button down.

Presence: What is the presence of the software controller that the user manipulates via hardware? It may be *visible*, like a scrollbar; it may be visible *as part of the content*, such as a character in an animated game; or it may be *invisible*, as in the case of a collage of images that pans continuously as the viewer rolls the mouse.

Control System Placement: Where are the controller and its associated parts placed? They can be *in front of the contents* being affected, such as a scrollbar; or they can be *part of the content*, such as a corner of a page that gets flipped. If they are *invisible*, they don't have a placement at all.

Interaction Perspective: How does the control system encourage the reader to relate to the content? Readers may view the world through their own eyes, reaching into the content space, as in the *first person* view of virtual reality. They may interact with the world through *second person* experiences of a character in the content space, for example controlling the progress of a game by influencing the actions of a character. Or they may interact with the contents via *third person* controls that are independent of the contents, such as those that float in front of content spaces and are controlled by an autonomous pointer cursor. (The perspective of the control system may or may not be consistent with that of the narrative. The relation between the two presents interesting authoring choices.)

Control Device Controller: What kind of control interpreter exists between the hardware device and the software device? Third person devices tend to use a *cursor*. When activated, the cursor may remain present, directing a device subpart, or it may disappear so the reader's physical actions can be mapped onto the coordinate system of the *device* rather than the coordinate system of the screen. The latter is useful if the controller is small yet invites a broad range of mouse travel. For instance, in

Premiere's scrubbing tool, the cursor remains visible but the editor's mouse motions continue to affect the position of the video well beyond the cursor's visible range.

Second person devices tend to use a *character* or actor as both device and controller. Sometimes, though, a character acts on devices within the content space.

First person devices, when they're *invisible*, may have either an invisible or visible controller. Choosing to forgo a visible controller keeps the purity of the content's frame but is more difficult to provide affordances. A visible controller can be used to provide feedback and helpful information about usage beyond the effects apparent in the space, but this tends to undermine the first person perspective.

Device Sensitivity: Software devices can be either *position* sensing, *force* sensing, or *motion* sensing. Position sensing devices respond to the absolute position of the controller on the device, in terms of onscreen x and y axes. One example is a pull-down menu.

Force sensing devices respond to movement within the hardware device, independent of the screen position of the cursor (if indeed there is one) or the associated media controller. They respond only to changes in hardware x and y. Think of a continuous video controller: While the mouse is still, the video plays at 1x speed. But as it is rolled to the right, the video speeds up, and when the mouse stops rolling, the video slows again to 1x speed. This works well with trackballs because they can roll forever. It doesn't work as well with mice because readers must repeatedly lift the mouse and replace it on the table whenever they reach the mouse pad's edge.

Motion sensing devices fall somewhere between position sensing and force sensing. They attend to changes in onscreen x, y. A hand pointer that grabs and pans an image when rolled serves as an example. It is the motion of the pointer, not its specific location on the screen, that matters.

Interpretation: This refers to the ways in which physical device movement translates into software device movement. Both factors (*acceleration* and *inertia*) can be evaluated in terms of the effect on the controller or the effect on the contents.

Is there a *linear* one-to-one relationship between movement and output, or is output multiplied by an increasing factor or calculated to fit a curve as the reader moves the device? For example, mice, desktop trackballs, and portable computer trackballs all have different acceleration curves designed around different ways the hand and fingers are likely to move and express fatigue. It is efficient to use acceleration to give the reader wide breadth of control within a small range of movement. It is important, however, not to neglect fine resolution as a result.

Inertia refers to what happens to the content when the reader lets go of the controller. Does it stop immediately or does it keep moving? Does it continue for a preset distance or does it decelerate smoothly? The latter is good for tossing objects across a media space: Get the gesture going, then let go. . . .

State Upon Disengagement: What happens to the device when the reader lets go? Does it *spring return* to a resting position like a physical joystick or *remain in position* like a checkbox or radio button? Spring return is useful when the position of the device does not correspond directly with the position of the content, and when the device can be used over and over again from a resting position (like an audio or video scrubbing tool).

Device Output Value Stability: Devices that spring return are always *volatile*; they lose their output value when released. Devices that remain in position, however, are *nonvolatile*. Nonvolatile devices are useful in establishing a consistent mapping relationship between positions of the device and states of, or positions in, the content space. This is how scrollbar thumbs function, indicating the reader's current position in the document being scrolled.

Device Texture Perception: Devices can have *discrete* states, as do check boxes and play/pause toggle buttons. They can also have a range of *distinguished* positions, where a particular position always refers to a specific state or position in the content. For instance, the top of a scrollbar always refers to the beginning of a document. Distinguished position controls may be *notched* in that they snap to detents along the continuum of control. A continuous controller for video makes use of a notch point for 1x speed so readers can easily play a video at the correct speed. However, they can drag the control thumb continuously beyond that position to speed up or slow down. A *homogeneous* device operates smoothly across its range.

Device Boundaries: *Bounded* interactions operate within limits of motion (like a scrollbar, in which the thumb can move only within the bar). *Unbounded* interactions are unlimited (as invisible controllers can be). Some devices, such as Adobe Photoshop's first person panning hand, fall between the two definitions. They are unbounded insofar as they can move all over the screen, but they are also literally bound by the edges of the screen. Since the hand is grabbing a particular place on the picture, it would break the kinesthetic grounding if the program scrolled automatically when the hand reached the edge of the window.

Device Disengagement: A device can be disengaged by *releasing* the mouse button, by *clicking* once or a number of times, by *pressing and holding* the mouse button, by *rolling out of proximity* of it, or by *waiting* for a specified period of time.

Number of Control Axes: How many dimensions does the device move in? *1D*, like a scrollbar (x or y) or a button (z); *2D*, like a panning hand; or *3D*, like QuickDraw 3D's object rotation interactions.

Axis Independence: *Free* devices have more than one axis and are easy to move in any direction. They are good to use when there is no special significance to motion along a single axis. In contrast, *sticky* devices have a barrier (light or strong) that prevents inadvertent activation of one axis when another is being used. In many applications, the shift key activates this type of barrier, for example to help in drawing straight lines.

Axis Relationship: *Orthogonal* devices have axes fixed in a frame of reference, while *nested* devices move along axes that change because they are nested within other axes. QuickDraw 3D's object rotation interactions provide an example of axis nesting. As the user changes the orientation in one axis, the possibilities of rotation change in the other axes. It is reversible, though, because the interdependent movements can be unwound, letting the user rely on kinesthetic memory to quickly return the object to a remembered orientation.
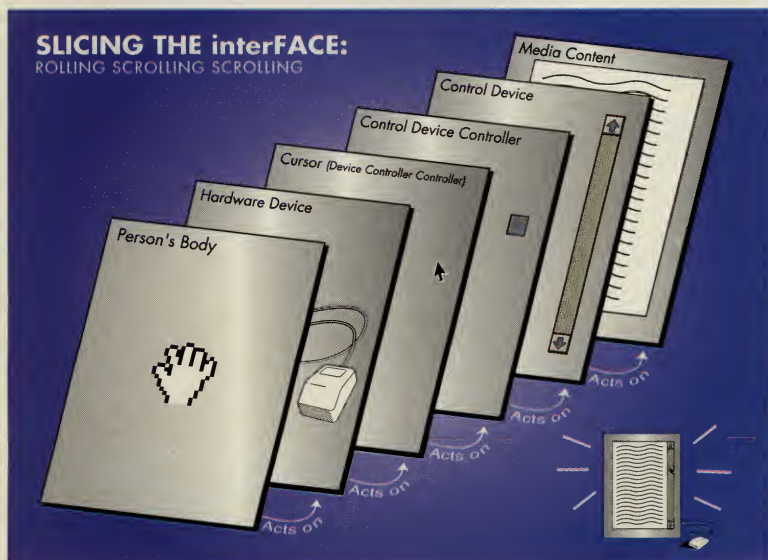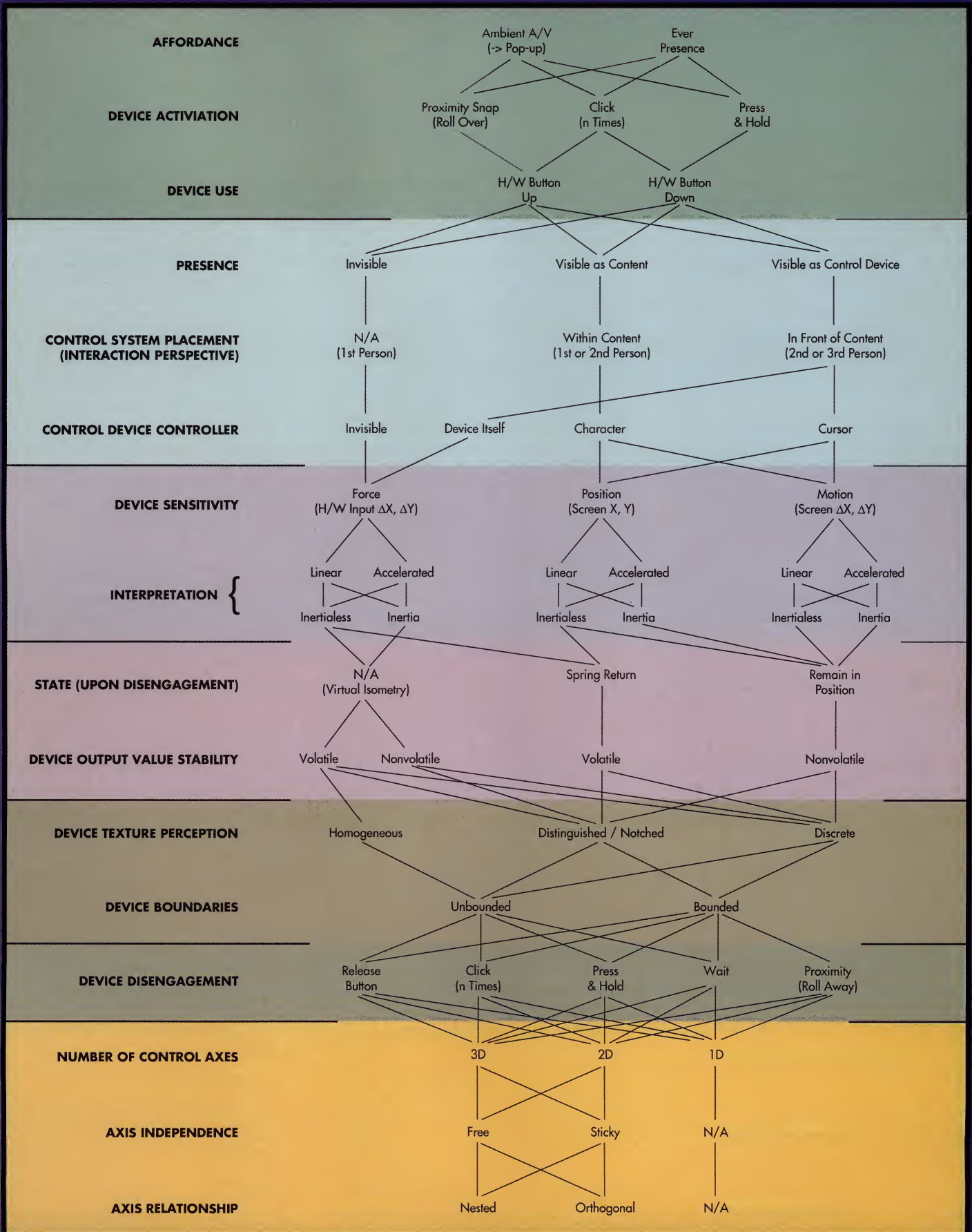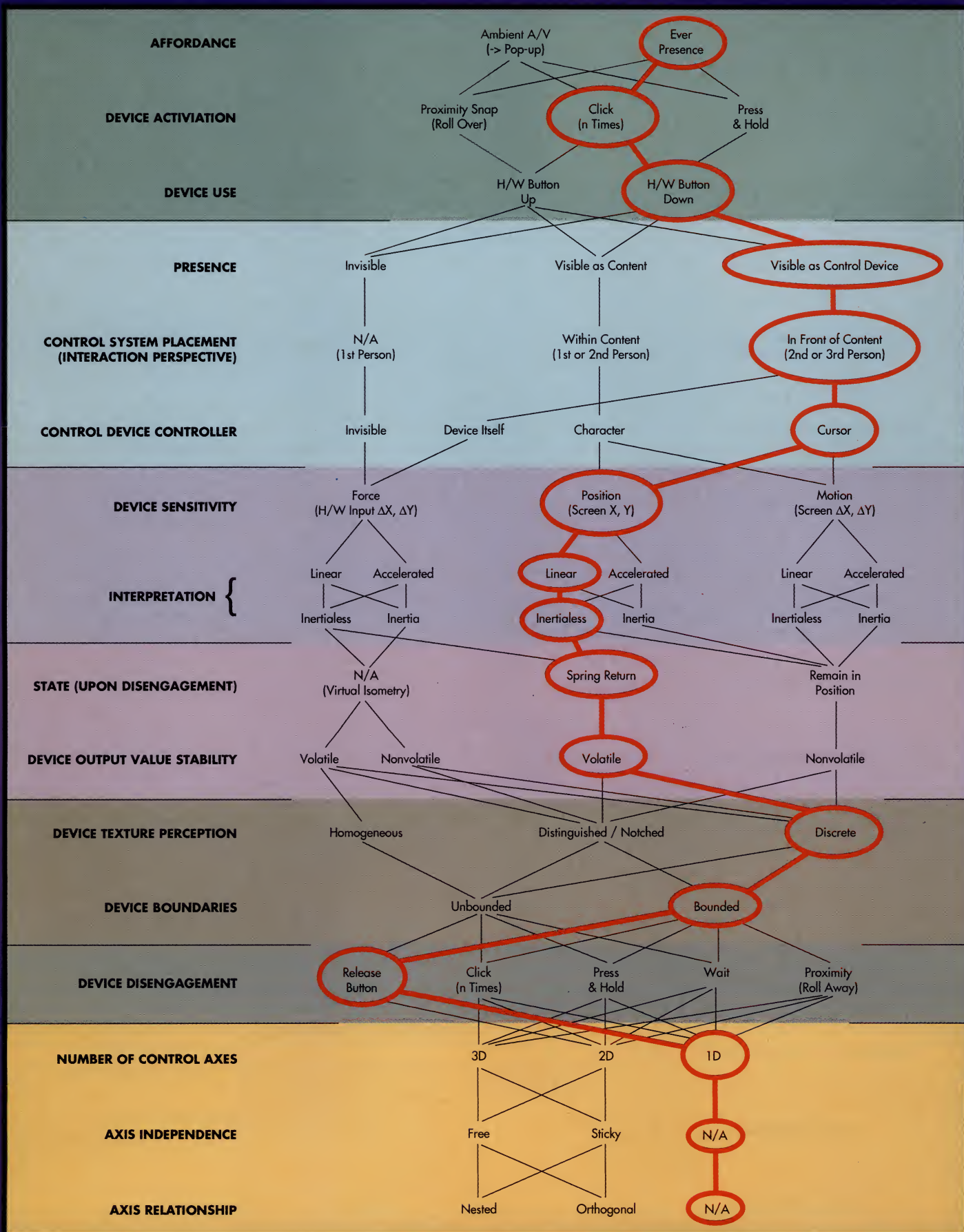

Figure 1. Layers of control between a person's body and media content: The boundary that the term interface defines can be interpreted on many levels.

SLICING THE interFACE:
ROLLING SCROLLING SCROLLING

Media Content
Control Device
Control Device Controller
Cursor (Device Controller Controller)
Hardware Device
Person's Body

Acts on

AFFORDANCE

Ambient A/V (-> Pop-up) Ever Presence

DEVICE ACTIVIATION

Proximity Snap (Roll Over) Click (n Times) Press & Hold

DEVICE USE

H/W Button Up H/W Button Down

PRESENCE

Invisible Visible as Content Visible as Control Device

CONTROL SYSTEM PLACEMENT (INTERACTION PERSPECTIVE)

N/A (1st Person) Within Content (1st or 2nd Person) In Front of Content (2nd or 3rd Person)

CONTROL DEVICE CONTROLLER

Invisible Device Itself Character Cursor

DEVICE SENSITIVITY

Force (H/W Input $\Delta X, \Delta Y$) Position (Screen X, Y) Motion (Screen $\Delta X, \Delta Y$)

INTERPRETATION {

Linear Accelerated Linear Accelerated Linear Accelerated

Inertialess Inertia Inertialess Inertia Inertialess Inertia

STATE (UPON DISENGAGEMENT)

N/A (Virtual Isometry) Spring Return Remain in Position

DEVICE OUTPUT VALUE STABILITY

Volatile Nonvolatile Volatile Nonvolatile

DEVICE TEXTURE PERCEPTION

Homogeneous Distinguished / Notched Discrete

DEVICE BOUNDARIES

Unbounded Bounded

DEVICE DISENGAGEMENT

Release Button Click (n Times) Press & Hold Wait Proximity (Roll Away)

NUMBER OF CONTROL AXES

3D 2D 1D

AXIS INDEPENDENCE

Free Sticky N/A

AXIS RELATIONSHIP

Nested Orthogonal N/A

AFFORDANCE

Ambient A/V (-> Pop-up)　　Ever Presence

DEVICE ACTIVIATION

Proximity Snap (Roll Over)　　Click (n Times)　　Press & Hold

DEVICE USE

H/W Button Up　　H/W Button Down

PRESENCE

Invisible　　Visible as Content　　Visible as Control Device

CONTROL SYSTEM PLACEMENT (INTERACTION PERSPECTIVE)

N/A (1st Person)　　Within Content (1st or 2nd Person)　　In Front of Content (2nd or 3rd Person)

CONTROL DEVICE CONTROLLER

Invisible　　Device Itself　　Character　　Cursor

DEVICE SENSITIVITY

Force (H/W Input ΔX, ΔY)　　Position (Screen X, Y)　　Motion (Screen ΔX, ΔY)

INTERPRETATION

Linear　Accelerated　　Linear　Accelerated　　Linear　Accelerated

Inertialess　Inertia　　Inertialess　Inertia　　Inertialess　Inertia

STATE (UPON DISENGAGEMENT)

N/A (Virtual Isometry)　　Spring Return　　Remain in Position

DEVICE OUTPUT VALUE STABILITY

Volatile　Nonvolatile　　Volatile　　Nonvolatile

DEVICE TEXTURE PERCEPTION

Homogeneous　　Distinguished / Notched　　Discrete

DEVICE BOUNDARIES

Unbounded　　Bounded

DEVICE DISENGAGEMENT

Release Button　　Click (n Times)　　Press & Hold　　Wait　　Proximity (Roll Away)

NUMBER OF CONTROL AXES

3D　　2D　　1D

AXIS INDEPENDENCE

Free　　Sticky　　N/A

AXIS RELATIONSHIP

Nested　　Orthogonal　　N/A

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			212.705.9300 (N.Y.)
			416.469.1505 (Canada)
BeachWare	134	66	619.735.8945
Beatboy Drum Sequences	135	66	717.685.1338
Big Fish Audio	136	66	818.768.6115
Blue Palm Productions	137	66	919.247.1058
British Audio Designs	138	66	714.470.1388
Cambium Development	139	66	914.472.6246
Canary Productions	140	67	610.825.5656.
Cascom International	141	67	615.242.8900
CBS NEWS ARCHIVES	21	77	212.975.2875
CBS News Archives	142	67	212.975.4321
CDA Interactive	143	67	212.575.0296
Celebrity Licensing	144	67	213.876.9615
Chameleon Music Production Library	145	67	413.789.1917
Creative Support Services	146	67	800.468.6874
CyberSounds/Sherwood Music	147	67	519.745.0021
Davenport Productions	148	67	704.535.4171
DeWolfe Music Library	149	67	212.382.0220
The Digital Kitchen	150	67	408.566.9098
Dimension Music & Sound Effects	151	67	770.502.8744
Dinosauremains	152	67	713.481.1256
DrumTrax	153	67	508.977.0570
East-West Soundwarehouse	154	67	310.858-8797
ELS Productions	155	67	800.927.3472
EMC Productions	156	67	612.771.1555
E-mu Systems	157	68	408.438.1921
Energetic Music	158	68	206.467.7101
Ensoniq	159	68	610.647.3930
Eye & I Productions	160	68	408.945.0139
FairBrothers	161	68	703.758.8478
Fearbabydisc	162	68	800.543.2933
FirstCom	163	68	800.858.8880
FOUR PALMS	34	92	703.834.0200
Fresh/The Music Library	164	68	603.643.3438
Gefen Systems	165	68	800.545.6900
Gene Michael Productions	166	68	616.695.4000
GMI Media Group	167	68	206.839.9414
Grand Illusion Sequences	168	68	904.734.0447
Greytsounds	169	68	805.650.8800
Hollywood Edge	170	68	213.466.6723
Hollywood Music Library	171	68	310.246.1590
Ilio Entertainments	172	70	818.883.4546
Impact Music Library	173	70	414.779.6434
Innovative Media Corp.	174	70	217.544.4614
InVision Interactive	175	70	415.812.7380
Janus Interactive	176	70	503.629.0587
Jasmine Multimedia Publ.	177	70	818.780.3344
Keyfax	178	70	408.688.4505
Killer Tracks	179	70	213.957.4455
Kurzweil	180	70	310.926-3200
Latino Sequences	181	70	305.559.9102
Lavskymusic	182	70	212.697.9800
L.B. Music Technologies	183	70	800.352.6874
Leonardo Software	184	70	310.820.2868

Column 3

COMPANY	RS#	PAGE	PHONE #
Liebert Recording Studios	185	70	212.840.1350
Manchester Music Library	186	70	203.846.3745
Manhattan Production Music	187	70	212.333.5766
Mays Midi Productions	188	70	216.274.2797
Metro Music Productions	189	70	212.799.1700
MIAMIDI Multi-Media	190	71	305.892.6434
MIDI Classics	191	71	800.787.6434
MIDI Mania	192	71	503.443.6434
MIDI Mark Productions	193	71	310.699.0095
THE MUSIC BAKERY	40	93	800.229.0313
The Music Bakery	194	71	214.414.0313
Musicraft Studio	195	71	301.604.6297
Musicrafters	196	71	215.368.8863
National Archives and Records Administration	197	71	301.713.7060
National Sound	198	71	212.564.3434
Network Music	199	71	619.451.6400
Norton Music	200	71	407.467.2420
OGM Production Music	201	71	213.461.2701
Omnimusic	202	71	213.962.6494
On Point Productions	203	71	800.331.8841
OSC	204	71	415.252.0460
Patco Resources	205	72	914.357.5300
PICTURE NETWORK INTL	11	20	703.522.1236
Pisces Music	206	72	212.682.1860
Porter Moore Music	207	72	716.429.7099
Production Garden Library	208	72	800.247.5317
Promusic	209	72	407.995.0331
Pro-Rec	210	72	212.675.5606
Q Up Arts	211	72	408.688.9524
QCCS Productions (PBTM Music)	212	72	503.345.0212
River City Sound Productions	213	72	901.274.7277
Roland	214	72	213.685.5141
Rubber Chicken Software	215	72	612.235.9798
Sampleheads	216	72	212.866.1533
Showcase Professional Studios	217	72	216.481.1161
Signature Music Library	218	72	219.921.0205
Sopersound Music Library	219	72	415.321.4022
Sound Concepts	220	72	310.796.0424
Sound Ideas	221	73	905.886.5000
Sound Patrol	222	73	212.213.6666
Sound Source Interactive	223	73	805.494.9996
SP Productions/Techsonics	224	73	804.547.4000
Sweetsong Productions	225	73	304.428.7773
Synclavier	226	73	603.448.8887
TM Century	227	73	214.406.6800
Trackbusters	228	73	800.844.4785
Tran Tracks	229	73	201.383.6691
TRF Production Music Libraries	230	73	914.356.0800
Trycho Music	231	73	909.696.3577
Tune 1000	232	73	418.877.8900
Valentino Music and Sound Effects	233	73	914.347.7878
VCE	123	95	818.367.9187
VIEWPOINT DATALABS	24	C3	801.229.3000
Voyetra Technologies	234	73	914.966.0600
Wayzata Technology	235	73	218.326.0597
W.D. Coakley	236	73	407.582.7709
The Well-Tempered Music Library	237	73	617.354.7012
Wolfetone	238	73	707.552.7584
VIDEO			
Discreet Logic	111	19	514.272. 0525
DATA TRANSLATION	3	4-5	508.460.1600
SAI	110	19	44.181.578.5668
Terran Interactive	114	20	408.353.8859
U LEAD SYSTEMS	5	8	310.523.9396
TERRAN INTERACTIVE	31	91	408.353.6231

# Why Creating Music for Games is So Hard

BY DAVID JAVELOSA
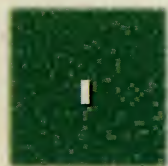
I n previous columns I've made no secret of the trials, tribulations, and general discomfort involved in developing music for computer and video games. One recent example: A game producer requested that I use more sampled sounds to enhance the realism of the score. Meanwhile, the head programmer insisted that all the sounds be synthesized in order to minimize memory requirements. In situations like these — which occur more often than not — musicians find themselves treading a thin line between audio quality and memory conservation.

The most common options are MIDI or streaming audio, synthesis or samples, 8- or 16-bit resolution, even mono or stereo. These are choices that a good multimedia producer should be concerned about and have an ear for. But when they do fall to the bottom of the priority list, it's not always the producer's fault.

Let's look at the specific memory limitations of various game platforms, specifically cartridge consoles, CD-based consoles, and desktop computers. And while we're at it, we'll look at one of the most talked about production technologies in the field, General MIDI.

Pick a Platform

The major division among game platforms
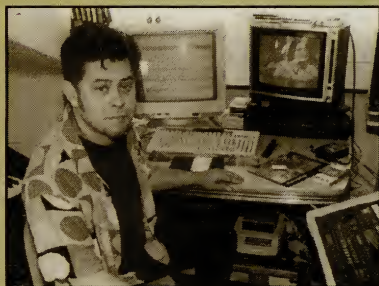
David Javelosa is part of the faculty at the University of Southern California Extension and at San Francisco State University's Multimedia Studies program. Formerly senior music designer for Sega, his recent work includes Marvel CD-ROM Comics, Disney Interactive, and a solo album of postpunk salsatronic lounge music.

is between dedicated consoles and desktop computers. There are those who favor one or the other, but each has advantages and disadvantages when it comes to both game playability and development.

In the PC world, the common approach is not unlike using a sledgehammer to pound in everything from railroad spikes to thumbtacks. You end up with features you may never use, and you pay for them. A good example is the current General MIDI specification, which requires PC soundcards to include every instrument sound that might be used. The applications themselves can be very light on music and audio data; the soundcard carries the burden for all of them. The benefit, of course, is that a single soundcard can be useful with a wide range of applications.

In the world of game consoles there's no such luxury. The design philosophy of game machines, tube-tops, TV add-ons, and similar massmarket electronics is to build them as inexpensively as possible. The parts are the cheapest available, and they're put together in a no-frills manner. Some insiders say dedicated game platforms are sold at a loss. Why? Because it's a software business. This leaves developers with a different set of memory requirements, sound chips, and audio tools for each box. Let's try to sort through some of the major ones.

In the days of the venerable cartridge machines (primarily Sega Genesis and NEC TurboGraphix), you had to work with fairly basic synthesis. FM was the technology and patch libraries were the only game in town. Even more primitive was Nintendo NES and other 8-bit machines, which used simple single-waveform generators — hardly synthesizers, but some clever tunes were written for them. The 8-bit sound chip lives on in hand-held game machines such as Nintendo GameBoy, Sega GameGear, and Atari Lynx.

The compactness of digital synthesizer patch definitions was well suited to the tight ROM space of a cartridge, not to mention the nearly nonexistent RAM available in the player. As for storing a large group of standard instrument sounds from which a composer could pick and choose, forget it. Every game had its own tunes (translated from MIDI) and its own set of instruments. There wasn't room for anything extraneous.

In cartridge systems, the next step up is to add sample playback (Super Nintendo, Genesis, and its weird cousin 32X). Developing for these platforms is a true feat of engineering and musical fortitude. Not only must you create your own instrument samples — few libraries exist — but the audio data must be as minuscule. The system provides a compression scheme for making sample data even smaller (and more grainy sounding), and some systems do the decompression on the fly, which can impact performance seriously.

For instance, Genesis, in addition to its FM voices, supports one sample channel. Up to 64k of audio data is available to play a single sound at a time. Super Nintendo plays up to eight sounds at a time but still has only 64k RAM. Now you can really start to feel the pain, baby!

The Next Generation

Surprisingly, two "next generation" systems, Atari Jaguar and Nintendo Ultra 64, play cartridges. This enables them to forgo a CD drive, thus keeping the price point low. And because they don't need to deal with the time it takes to access a CD, these games react to the player faster and provide more immediate interactivity. The tradeoff, of course, is in the amount of room that content developers have to play with. Once again, the composer must develop a limited set of custom instrument samples that will be compressed and then decompressed during game play. After all, there's a game going on at the same time as the music. Even the fastest of multiprocessor arrays have their limits.

Of course, the latest round of dedicated game machines — Sony PlayStation, Sega Saturn, and 3DO — plays CDs that hold a whopping 600MB or more. The CD drive makes these babies relatively expensive, as does the additional RAM necessary to support all that juicy data. Both Saturn and PlayStation have half a meg just for audio, but even a slow-paced game is going to hit the CD for more data eventually. For high-quality audio, 512k isn't much, and the lower the quality, the less the player will want to hear it. Noble efforts have been made to provide decent development tools and sound libraries, but there's still no room for sledgehammer specs like General MIDI. Only for pain and creativity.

Games On The Desktop

On the other hand we have the desktop computer. This includes Mac and Amiga, but the hands-down winner for most gamers is the PC, albeit equipped with such peripherals as a soundcard. Due to the vagaries of these peripherals, developing for desktop computers traditionally has required as much custom driver work as developing for a dedicated game console. But with the advent of the multimedia standards and initiatives aimed at developing an industry-wide soundcard specification, writing music for these platforms is becoming easier.

(Win95's newly released DirectX APIs promise to standardize game-related features such as color depth, video playback, and soundcard compatibility, making PC-based games an install-and-play proposition for users — although the word on the street is that we're not quite there yet. However, what this means to developers is difficult to assess. Until Microsoft's Judgment Day launch on Oct. 30, 1995, developers who had access to the Windows 95 Game SDK weren't allowed to talk about it. One bit of information that has emerged is that DirectSound handles digital audio in .WAV format only. If you're doing crossplatform work, you'll need to do format conversions on your audio files.)

The first thing to understand is that the instruments are on the soundcard. The only thing required of the game itself is performance information in the form of a MIDI file, and as much digital audio data as necessary for custom sound effects and voiceovers. The quality of the sound is determined by the card. Lowend cards provide FM synthesizers much like the chips in the 16-bit cartridge-based games. Better ones include lush sets of sampled instruments, and daughterboards are available for upgrading to still better sample sets. Lately audio gurus have been arguing over the best technology for downloading custom samples (instruments, effects, or whatever) into soundcards, either for general use or for a specific title.

As game development becomes increasingly a crossplatform proposition, developers and publishers stand at the crossroads between the dedicated platforms and the desktop. Soundcards with sample ROM constitute the major difference between the two worlds, and this difference is the deciding factor in how General MIDI is to be used.

General MIDI

General MIDI (GM) was developed to standardize the management of MIDI data. The critical aspect of the spec is that it defines 128 specific sounds as the palette available to composers. Any time you're working with a GM platform, you can count on having these sounds. In a dedicated game machine, with little memory available for audio data, you'll be hard-pressed to duplicate the GM sound set. Any unused data, whether synthesizer patches or samples, will be purged at the time of final assembly. And at run time, samples will be loaded only as needed, and only for as long as needed. Consequently, the first rule of thumb is to consider General MIDI only for computers and soundcards (or other GM-compatible sound source), and custom patches and samples only for dedicated consoles.

Keeping crossplatform development in mind, you can compose for the GM instrument set to create a file for the PC version of your title. Then you can develop the sounds used in your composition, or gather them from libraries or previous productions, for the game console version. But this is where you need to be careful. After you've matched each arrangement with the associated instruments, every instrument not used must be eliminated. If by accident you eliminate one that is being used, you stand to mess up the entire set — this is known as a bug among programmers. Also keep in mind that different scores using the same sound library tend to sound the same, even though the music may be entirely different. Focus on finding fresh sounds and avoiding tired ones.

Producers need to understand General MIDI, the restrictions involved in the various game platforms, and the hassles of reconciling data produced for them. I recently worked on a cartridge-based title published by an entertainment company known for quality content. Their producers relied on the developer to deliver the best possible music. But the developer was accustomed to working on PC games and naturally took advantage of GM to get several composers working on the music at once. The music turned out well but it wasn't what the publisher wanted, so they hired their own composer, who also used the GM set. The developer was busy reconciling the various music files to eliminate GM-specified instruments that weren't needed. Meanwhile the producer, ever pushing for quality, demanded more and more custom patches. The publisher, developer, and three composers were each in a different city working under a looming deadline. A living nightmare.

General MIDI is a great step forward, but when memory capacity is an issue, watch out. In this case GM is best considered a general guideline, a preliminary palette from which to choose no more instruments than the platform can handle. As usual, creativity refuses to be mechanized. As an interactive composer, you have no choice but to get your fingernails dirty and practice your craft! 🐾

PLATFORM	DELIVERY MEDIUM	AUDIO TECHNOLOGY	SAMPLE ROM	GM
Dedicated Game Platforms				
Sega Genesis	cartridge	FM synthesis	n/a	no
NEC TurboGraphix	cartridge	FM synthesis	n/a	no
Genesis	cartridge	FM and samples (one voice)	64kB	no
SuperNintendo	cartridge	samples	64kB	no
Atari Jaguar	cartridge	samples	64kB	no
Nintendo Ultra 64	cartridge	samples	64kB	no
Sony PlayStation	CD	samples	512kB	no
Sega Saturn	CD	samples	512kB	no
3DO	CD	samples	512kB	no
Desktop Computers				
PC	external sound card	FM and/or wavetable	varies (preset)	yes
Mac	QuickTime 2.0	samples	429kB (preset)	yes

Dangling By A Thread

Multithreaded Programming, the Be Computer, and Other Stuff

BY   JOHN   WORTHINGTON

Multithreaded programming may not be on a par with those adventure movies where the hero, dangling over a chasm by a thread, suddenly comes up with a cunning plan to escape from the bad guys and save the world. But it's about as close as multimedia programming gets. Besides, with new operating systems, you never dangle by a single thread. We're entering a brave new multithreaded world.

The latest chasm I had the privilege to dangle over is called the BeBox, a new computer created by Be Inc., the company Jean-Louis Gassee founded after he left Apple Computer. It features a multithreaded operating system, two PowerPC 603 processors, and all the usual multimedia goodies, including built-in MIDI ports and 16-bit audio. The company promises up to eight processors in future boxes. They wanted to create a computer that was bold and different. I think they succeeded.

Here at MojoSoft, we've had a BeBox developer prototype for a couple of months. We started hacking away on a multichannel digital audio editor we've been calling BeBop, basically getting a feel for the machine and the new programming model. Then one fateful day Erich Ringewald, VP of engineering at Be, called and said they wanted to demonstrate BeBop playing back lots of channels of digital audio at their product announcement. We were asked whether they could use BeBop as part of their demo. Of course, I said yes. As soon as I hung up the phone, I knew I was in trouble. Up to that point I hadn't really thought

much about programming with multiple threads. Now I was dangling from them. It was time for a cunning plan.

Why Multiple Threads?

Multiple threads are really about convenience and performance. In the typical multimedia program, several things are going on at once. You might have music playing in the background. Buttons flash on and off. Video rolls. Text scrolls. Instead of doing all kinds of fancy programming tricks, you'd like to just tell the music to start playing and continue until you tell it to stop. Let's look at a simple example, the flashing button.

Assume that you have two bitmaps, one for the ON state and another for the OFF state. Making the button flash is easy. Draw the ON state, wait a while, and then draw the OFF state.

On a multithreaded system, you would write a little code snippet to do this and spawn it as a thread. At that point the code would run on its own until it finished or the thread got killed.

A single-threaded system is more of a problem, since you would have to check for user interaction at a minimum between flashes. A Macintosh program I wrote several years ago was peppered with calls to a routine I wrote called CheckFlash(). All it did was check to see if it was time to flash the button. It made the code a mess to read.

The one downside to the multithreaded approach is that usually when one thread hangs, it doesn't hang the others. This means the app might hang while the button happily goes on flashing. It might take the user a while to figure out that the application has hung. Of course, my apps never hang. Swampland anyone?

Unfortunately a single CPU can do only one thing at a time. It may seem like it's doing multiple things simultaneously, but it's really just focusing intently on a single thing for a small amount of time. How does it decide what to focus on? The same way you or I do — by setting priorities.

Think about it. You're sitting at your desk working on something. The phone rings. You stop what you're doing to take the call. Maybe the boss walks into your office with something really important, so you put the phone call on hold. Later, when the important business with

the boss is done, you resume the phone conversation. At some point you might even get back to the less important work piled high on your desk.

When you create a thread, you give it a priority. Something like flashing a button might be a really low priority. Sending audio samples to the DAC would be a really high priority. The usual user interface stuff would be someplace in between. Obviously, updating the front

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BeBox Hardware

Microprocessors: Two PowerPC 603 CPUs running at 66MHz.

Memory: Supports up to eight 73-pin SIMMs (up to 256MB with 32MB SIMMs).

Disk Drives: One PC-standard 1.44MB 3.5-inch floppy disk drive; onboard support for IDE and SCSI drives; two internal 3.5-inch half-height drive bays, and two exposed 5.25-inch half-height drive bays for CD-ROM drives, Syquest drives, etc.

Display Controllers: Supports PCI SuperVGA controllers such as the #9 GXE 64.

Networking: Supports industry-standard ISA Ethernet cards; serial modems on serial ports.

Interfaces: Three internal full-length PCI card slots at 33MHz; five internal full-length ISA card slots; PCI SCSI II controller for up to seven SCSI devices; IDE controller for PC-standard hard drives; standard PC keyboard connector; PS/2 mouse connector; parallel port; two MIDI ports (one in and one out per channel); four RS-232 serial ports with 16550 UARTs; two high-resolution joystick ports; three infrared controller ports; GeekPort supporting general I/O with A/D and D/A; 16-bit sound.

Contact: Be Inc., 800 El Camino Real, Ste. 300, Menlo Park, CA 94025; vox 415.462.4141; fax 415.462.4129; Internet: info@be.com, http://www.be.com. Reader Service #109

window is more important than updating the other windows.

The performance part of multiple threads hinges on priorities. The operating system gives time to the highest priority threads first. If several threads have the same priority, one of two things happens. On a preemptive system, each thread is given an equal amount of time. That is, the threads share the processor and are interrupted when their time is up. On a non-preemptive system, once a thread starts executing, it runs until it is polite enough to yield to another thread. Of course, in a couple of years everyone — including the Macintosh — will be preemptive.

Things get a little more interesting if you have multiple processors. On the BeBox, you can run multiple threads simultaneously on multiple processors.

In BeBop, I decided to make each channel of audio a separate thread. The channel's thread is responsible for reading the correct chunk of audio off the hard disk, performing any digital effects, and passing the audio to the mixer. This works out well because it's convenient to think of an audio channel as something atomic. To add more channels, I simply spawn more threads. There is a limit because at some point either the computer or the hard disk can't keep up.

What about breaking things down further? Maybe make each effect run as a separate thread? Well, in a multiprocessor system you do want to do as much as possible in parallel. This means splitting things up so you have at least as many threads as you have processors. In the case of BeBop, splitting things up along channels makes sense because there will almost always be more audio channels in the mix than processors in the machine.

That Old Syncing Feeling

If you do enough realtime programming, especially with audio or video, then you've probably had synchronization problems try to bite you in the nether regions of your anatomy. You'll run into similar problems when using multiple threads.

The problem is that you have several things going on at once, typically executing in no particular order. Usually everything needs to get synchronized at some point. In the case of BeBop, this point is the mixer. If we don't read exactly the same amount of audio from each channel, the channels will slide out of sync.

To synchronize the channels we use something called a semaphore. The whole purpose of the semaphore is to make one or more threads wait until we're ready for them to continue.

The mixer asks all the channels to go out and process a buffer full of audio. After the channel has passed the buffer to the mixer, it tries to acquire a semaphore that tells it to go get another buffer. At this point the channel stops and waits until the mixer releases the ap-

propriate semaphore. It's important to realize that when a thread is waiting for a semaphore, user input, or whatever, a multithreaded operating system will let other threads execute. This lets you get as much performance as possible out of the computer.

Big Nasty Bugs

The more threads you have running at once, the harder it is to find bugs. This is the one place where running multiple threads makes life less convenient. I haven't found lots of really good techniques for debugging multithreaded code. But I'm sure you readers must have some ideas. Send them in, and I'll share them with everyone.

One thing I've found useful is using printf to print status messages. It's usually fairly easy to find out what the current executing thread is. Whenever I printf a status message, I also printf which thread is executing. This can be a real lifesaver when you have lots of threads doing the same thing. On the BeBox, this presented a little problem because in the version of the operating system I was using, printf wasn't thread-safe. If multiple threads tried to printf at the same time, the characters would be interleaved. The solution? I created a single print semaphore for my application. Around calls to printf, I would acquire and release the semaphore. That way only one thread could print at a time.　　　　　　　　🐝

Do You Want To Know A Secret?

A Look at Idea Protection and Non-Disclosure Agreements

BY CHARLES B. KRAMER

Long before your interactive title leads to money, journalists begging for interviews, and venture capital offers you turn down because you prefer independence, before even the hard work of writing code and producing video clips, comes the *idea*.

The idea may be the basis for an entire project — how about an electronic version of the old pencil-and-paper game Hangman? But potentially valuable ideas include lesser brainstorms. An insight about which developers might work well together as a team, the inspiration to use certain public domain film footage, or the idea of contacting a particular publisher to finance an independent project may each be valuable.

These ideas are not protected by patent or copyright law. Patents can protect ideas, but only after an expensive and time-consuming application process, and only in the rare instances that the ideas are (among other things) "non-obvious" to one skilled in the pertinent field, and are in the form of a process, machine, or other patentable subject matter.

Copyrights, in comparison, automatically protect "original works of authorship" once written down, saved to a computer disk, or otherwise fixed in a tangible medium. But the Copyright Act makes explicit that in

no case does copyright protection . . . extend to any idea, procedure, process, system, method of operation, concept, principle, or discovery, regardless of the form in which it is described, explained, illustrated, or embodied. . . .

This means that even if you write down your idea, what you've written may be copyright protected, but your idea itself is not. A

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movie script is ordinarily copyright protected, for instance, but basic situations and themes within it ("boy meets girl on the beach, and both are abducted by Martians") are considered unprotected.

Without copyright or patent protection, your ideas are (in the words of one court) "as free as the air and as speech and the senses." They can be used and publicized by anyone who hears them.

All of which puts those of us with brainstorms in a vulnerable position. Ideas need to be disclosed for others to evaluate them, improve them, or help put them into action. This often means exposing them to the very companies — like large manufacturers, publishers, producers, and studios — that can easily, even accidentally, exploit them without compensating you. What's a person with a brainstorm to do? The answers have implications for those who want to benefit from their own ideas and

for those who evaluate ideas but do not want to pay for ones they do not use.

But first, precisely what sorts of ideas can be protected?

Keeping Secrets

The answer varies from state to state and from legal theory to legal theory. In general, ideas are most protectable when they constitute "trade secrets." Trade secrets, to quote an old definition, consist

of any formula, pattern, device or compilation of information which is used in one's business, and which gives him an opportunity to obtain an advantage over competitors who do not know or use it.

A more recent definition found (with variations) in many state statutes provides that an idea is a trade secret if it has "actual or po-

COVER YOUR ASSETS

tential" economic value not generally known or "readily ascertainable by proper means" by others who could benefit from disclosing or using it. The definition also provides that protecting an idea as a trade secret requires it to be kept secret by "reasonable efforts."

Both definitions are broad. They do not require a protectable idea to be completely secret — it only has to be "not generally known." They also do not require the idea to be particularly insightful — it merely has to give an "opportunity" for a business advantage or a "potential" economic benefit.

So would my brainstorm about creating a video game version of Hangman have been a trade secret if I had not disclosed it here? Maybe not. In Georgia, for instance, which maintains an older, more narrow view about what's protectable, one court held that the idea to expand a known card game into a video game was not "novel" or "concrete" enough to be a trade secret.

But in many states, an idea may be protected even when it's not a trade secret, at least as long as the idea is not already known by the person receiving it.

In 1964, for instance, a Hollywood producer had a brainstorm: How about a movie version of Shakespeare's *The Taming of the Shrew* starring Richard Burton and Elizabeth Taylor? The brainstorm included the ideas of eliminating Shakespeare's "play within a play" device, filming in Italy, and using a certain director. The producer disclosed these ideas to the director's agent, Burton's agent, and later to Burton himself. The idea was ultimately used, but the producer got neither money nor credit, and sued.

The defendants argued that the producer's brainstorm was not novel and therefore not protectable. In fact, *The Taming* had been made into a film that eliminated the play within a play device before, and by stars who were married as Burton and Taylor then were. The choice of director was no revelation either. He had directed at least one Shakespearean production before. Nevertheless, the court held that the producer's idea was protectable.

But no matter how novel, concrete, economically valuable, and secret an idea is, ideas are still free except in two main situations: When disclosed under a written or implied contract, and when disclosed in a relationship where the recipient is expected to keep the idea confidential.

Contracts and Relationships

An idea is disclosed under an implied contract when all the facts and circumstances taken together indicate the recipient understands it would have to pay if it uses or discloses the idea. The understanding must exist before the idea is disclosed, and the amount of payment should be either agreed upon or inferable based upon either the prior dealings of the parties or industry practice. In the case of *The Taming of the Shrew*, for instance, the court found that a contract could be implied if the producer's idea had been disclosed on the condition that if the idea was used, the producer would produce the film and would, in any event, be paid his usual fee for producing.

Absent an implied contract, an idea may not be considered free if the discloser and recipient have a pre-existing relation of trust and confidence in which maintenance of the secret is expected. Qualifying relationships include those between employers and employees, among parties contemplating starting a business together, and among those who understand (as in *The Taming of the Shrew* case) that disclosure is conditioned on payment if the idea is used.

Beyond the narrow confines of these rules, ideas remain free. In one illustrative case, the Favorite Things toy company invited R. Dakin & Co. to purchase it. In the negotiations that followed, Favorite Things asked Shelley Aliotti, one of its contractors, to show her designs for dinosaur dolls. Dakin decided not to purchase Favorite Things and instead started its own line of dinosaur dolls. Aliotti sued and lost. The court found that Dakin may have copied the idea of Aliotti's dolls, but not any copyright protected aspect of them. The court found that copying the idea was not illegal because Aliotti's disclosures were made in the context of a possible purchase of Favorite Things and not a possible purchase of Aliotti's designs. No implied contract or relationship that protected Aliotti could be found.

Relying on an implied contract to protect ideas you disclose may be even more uncertain than these cases suggest. The common understandings on which implied contracts can be based vary from industry to industry, and are always difficult to prove. Some industries have elaborate mechanisms, such as mailrooms that pull idea submissions before they can be evaluated, that make proof extremely unlikely. To avoid these uncertainties, do not disclose your ideas until the recipient has signed a Non-Disclosure Agreement (NDA). (See Sample NDA on page 89). An NDA among other things can:

▶ Make clear that the disclosure will be made on the understanding that the recipient will pay to use or further disclose the idea.

▶ Describe the idea being disclosed well enough to make clear that it is a protectable one.

▶ Characterize the relationship between discloser and recipient as one in which maintenance of the secrecy of the idea is expected.

One problem with NDAs is that many companies refuse to sign them even though they are perfectly willing to pay for brainstorms they do use. These companies are reasonably concerned that your brainstorm may be obvious, or something already known or in development at some outpost of their far-flung empires. Some companies not only refuse to sign NDAs, but as a matter of policy require an idea submitter instead to sign an "anti-NDA" contract. Anti-NDA contracts typically characterize the relationship between the discloser and the company as one where confidentiality should not be expected, and provide that no obligation will arise out of the company's preliminary review of the idea.

Even if a potential idea recipient won't sign an NDA, an idea may still be disclosed in a way that has a chance of protecting it. The strategy is to provide a basis for claiming — in court, if necessary — that the idea is protectable and was disclosed under an implied NDA and in the context of a confidential relationship. The strategy is implemented by taking these steps:

▶ Communicate before disclosure that you anticipate you will be compensated if your idea is used or disclosed.

▶ Disclose the idea only in written, numbered copies delivered in envelopes with the word "secret" or "confidential" on the seal. Keep a log of each recipient and the purpose, date, and result of each disclosure.

▶ Disclose only as much as necessary. This may require disclosing different things to different recipients.

▶ Treat the written form of the ideas as you do other valuable documents, such as checkbooks.

▶ Mark the parts of the writing that are secret "secret" or "confidential."

The purpose of this strategy is partly to keep your ideas secret and partly theatrics. While seeking the benefit of your ideas inevitably involves the risk that you will lose them, the strategy can help you prove, if you ever need to, that you have protectable ideas and have taken "reasonable steps" to preserve their secrecy. ❧

This column provides general information and not legal advice, which requires an evaluation of individual circumstances.

~ On Your Business Letterhead ~

Dear prospective idea recipient:

As you know, I have ideas for an interactive title involving space travel (the "Title"), including ideas for a possible development team. If you decide to use the ideas, I expect you will engage me to produce the title, or as we may otherwise agree.

In connection with our discussions I may disclose or you may otherwise learn ideas I regard as my confidential information. As a condition of disclosure and of your possible future involvement with the Title, please sign the enclosed copy of this letter and return it to me to indicate your agreement to the following.

1. CONFIDENTIAL INFORMATION

1.1. My Confidential Information consists of nonpublic ideas and other information relating to the Title that you receive or otherwise learn in connection with our discussions or work together that you know or should know I regard as confidential. It includes such information, if any, that you received or learned in our discussions before signing this Agreement. The information may or may not be stamped "confidential," or in the form of a business plan, computer source code, list of names, description of potential products, or other tangible thing.

1.2. My Confidential Information does not include information that was already known by you, or that subsequently becomes publicly known other than as a result of disclosure by you directly or indirectly, or that is subsequently disclosed to you by a third party who does not, by such disclosure, violate any duty or obligation to me.

2. HOW TO TREAT IT

2.1. You will not use or disclose my Confidential Information except to the degree necessary and proper to fulfill the purposes of your discussions with me (or with others at my request), or to comply with any court order or other legal process.

2.2. You will maintain the confidentiality of such information at least to the same degree as you maintain the confidentiality of your own such information. Irrespective of your general practices, however, at a minimum this agreement obligates you, among other things, to store the information in a secure place and to disclose it only to your employees or agents on a "need-to-know" basis after they agree in writing not to use or disclose it except in accordance with this Agreement.

2.3. Upon the earlier of 10 days following notice from me, or when you no longer need my Confidential Information to continue our discussions, you will promptly return my Confidential Information to me to the extent it is in tangible form, and will erase or destroy any copies on your computer or other medium that you own or control.

2.4. In the event you are compelled by legal process to disclose my Confidential Information in whole or in part, you will if legally permitted provide prompt notice to enable me to seek a protective order or other appropriate remedy.

3. MISCELLANEOUS

3.1. If Section 2 of this Agreement were breached, I would be irreparably injured and inadequately compensated by money damages and will accordingly be entitled without bond, other security, or proof of damages to an injunction and other appropriate equitable remedies with respect to such breaches and to threats of such breaches, in addition to such other remedies as I may have.

3.2. This Agreement (a) shall be binding upon and inure to the benefit of the heirs, successors, and assigns of the parties hereto, including any corporate or other entity that I may use to develop the Title; (b) may not be modified, waived, or superseded except by a signed writing; (c) shall be interpreted and enforced under the law of [applicable state] without reference to its choice of law provisions.

Very truly yours,

_____
(your name)

ACCEPTED AND AGREED:

Company: _____
    (if applicable)

Signature: _____ Name: _____ Title: _____
    (if applicable)

Cry Havoc!

Techniques for Realistic Explosion, Fire, and Smoke Effects by Combining Video and 3D Animation

BY MARK GIAMBRUNO

Three-dimensional graphics are being pressed into use as replacements for expensive live action and physical-model effects in both film and multimedia work. The realism of 3D graphics makes it feasible to construct and animate cars, planes, ships, and the like and to create elaborate animated stunts without danger to people or property (except maybe the animator's wrists, eyes, and sanity).

Making a Mess

One of the most challenging parts of an effects shot is the result of the stunt — the explosion, debris, fire, and smoke that ensue. There are two reasons for this: Traditional 3D modeling and animation tools were clumsy and ill-suited to creating these effects, and we're all familiar with what these phenomena look and feel like, so we spot errors easily. In some ways, the complexity and accuracy required when creating these effects offers the same challenge to animators as, say, duplicating human movement.

There are three common approaches to creating these effects. One relies on traditional 3D tools, using mapping and animation techniques to create an acceptable (if stylized) result. The second is to use real effects that have been filmed, digitized, and then composited into the scene. This is the method most often used by movie effects houses. The third and newest method involves using particle systems as an enhancement to the standard 3D toolset. Particle systems manage clouds of tiny objects, making them look and move like fire or smoke. These capabilities are now standard in highend products from SGI/Alias/Wavefront and Micro-

Figure 1. Burning building sample from *Pyromania* CD-ROMs.

soft SoftImage, as well as IPAS modules for Autodesk 3D Studio and other programs.

Since particle systems are a topic unto themselves (and many users don't have access to them yet), we'll focus on combining traditional 3D with digitized video footage. For the purposes of this article, an excellent source of video clips is a pair of reasonably priced CD-ROMs called *Pyromania!* and *Pyromania2* published by movie effects specialists VCE (see sidebar on next page).

Feel the Heat

The *Pyromania* CD-ROMs contain footage of numerous explosions, fire, and smoke effects (see Fig. 1). All of the footage was photographed against a black background, digitized, reduced to 640x480 resolution, and saved as a series of sequential files.

The CD-ROMs also contain samples and information on modifying the effects (for example, turning one of the fire loops into a meteorite or rocket exhaust), as well as clever matting techniques and how to combine effects.

Pyromania! comes in Mac and PC versions, while *Pyromania2* is available only for the Mac at the moment. But don't let the platform deter you from picking up a copy — it really is that good. If you don't have the right

gear, borrow a system to convert the files into some format you can use.

One way to apply a *Pyromania* sequence is to use a digital editing program (Premiere, After Effects, Composer, or similar program) to add the effect in post production. Another method is to convert a file into a format that can be used directly by your 3D animation program and incorporate the effect as a mapped polygon. This is the preferred method for several reasons and practically a must if the camera is moving during the effect.

Mapping the effect onto a flat or curved polygon requires the creation of an opacity matte since most of the files don't come with an alpha channel. How this is done varies with the requirements of your 3D animation system. In some cases, you can simply use the same files or movie in the opacity channel and tweak the controls until the black background becomes transparent. In other cases, a digital editing program or batch processing feature of a graphic file converter (DeBabelizer, Hijack, and their ilk) may be used to generate an alpha channel or to palletize the images and replace the black background with the transparent color. The *Pyromania* CD-ROMs include some information about using Photoshop's Curves feature to re-
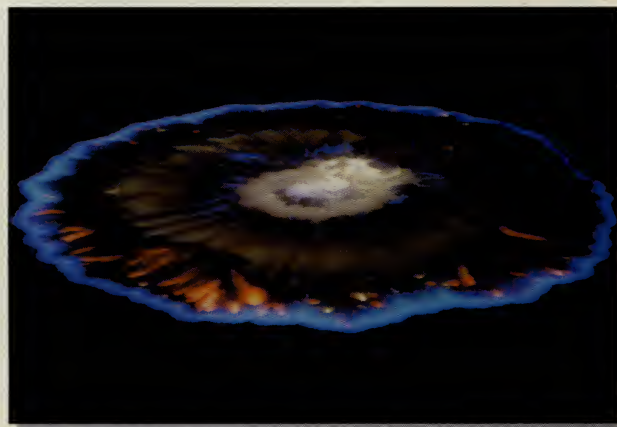
Mark Giambruno is the creative director of Mechadeus' first two multimedia titles, *Critical Path* and *The Daedalus Encounter*. His first computer was an Atari 800 with 48k of RAM. His first 3D program required manual, numeric entry of the vertices. Chopped wood to generate power for the system when not trudging five miles to school in blinding snowstorms.

Figure 2. Shockwave effect against a black background.

Figure 3. Model of Vakkar fighter from *The Daedalus Encounter* was filled with debris and animated with a *Pyromania* zero-gravity explosion in the background.

move the background, and about other controls that can smooth out the matte lines.

Before trying to design or animate any effects, take a close look at some action movie sequences to get a sense of scope and timing. The *Terminator* or *Die Hard* series are good bets. Viewing laser discs (CAV versions) or having a digital freeze-frame VCR really helps here, since you can study effects frame by frame.

Now, let's look at how mesh, lighting, and animation can be combined with *Pyromania* clips to create spectacular blast effects.

Explosive Situations

A lone tank rumbles across the charred battlefield seeking prey. From a distant stand of trees, an Apache helicopter releases its deadly payload, a television-guided Maverick missile. Too late, the tank commander realizes his peril as the missile slams into the tank, shattering it into — a couple hundred triangular polygons?!

All too often, this is the anti-climactic result of a polygonal 3D explosion effect. The target object is destroyed with all the gut-wrenching power of a Christmas ornament shattering on a hardwood floor. The problem is that non-solid 3D models are hollow. The only material available to these shatter effects is the skin of the object.

Part of the solution is creating some innards for the model (see Fig. 3). These do not have to be very detailed. Just make sure the volume of stuff inside seems reasonable, say about 30%-60% of what you would expect to find inside the model if it were complete. Most of the mesh should be burnt, bent, and broken. One way to get this mesh assembled quickly is to use old models and mesh libraries as your source. Grab some objects, jumble them around, and apply a map that makes them look suitably pitted and charred. If the objects are mapped already, you may want to alter the existing maps, adding burn marks and gouges, or add a second damage map to the material.

Another important part of the process is breaking up the exterior of the model into chunks that you can animate flying outward instead of relying on a polyg-

onal shatter effect. Boolean tools work well for this, especially if you create a DAMAGE TOOL. This is a jagged, bent piece of mesh that can be used to Boolean your existing model into numerous chunks of debris. With some programs, if the DAMAGE TOOL is properly mapped, it will automatically apply the damage material to the places where it cuts the original model, saving you some time. Be sure to save your DAMAGE TOOL before using it if your program deletes the original objects as part of the Boolean operation.

Lighting is a key element in explosions and can really heighten realism. Multiple, bright shadow-casting lights arranged near the blast centers and animated in concert with the exploding mesh throw illumination onto the debris and surrounding objects. You can also add projection maps to some of the lights. This makes the effect more apparent if the lighting

Figure 4. Anti-aircraft flak blast from *Pyromania!*

alone is not enough. These maps might be still images or animations consisting of a radial gradient from white in the center to yellow/orange

midway to black at the edges. They also may have bright spikes radiating outward.

Refer to your action movie library to get a sense of timing for the blast. I find that most animated explosions start off too slowly or end too quickly. An explosion is fast and violent at the beginning, then slows as the energy is dissipated over a larger area. The slower the fireball moves toward the end of the explosion, the larger the explosion appears to have been.

Here are some other tips to keep in mind when animating:

▶ Shake the camera around a bit, especially a few frames after the start of the blast when you would expect the shockwave to hit your position.

▶ Have some small objects skitter along the ground near the camera when the shockwave strikes.

▶ Adding a single white frame in the animation or during postproduction at the instant the explosion becomes visible can be very effective. You might also want to brighten the frames before and after the white one.

▶ Put some additional touches, like lens flares, hand-drawn debris, or blast damage, into some of the frames. Adding this stuff during post may be faster than rendering and re-rendering the animation until it's just right.

▶ Use smooth arcs to define the path of the debris.

▶ Make the projectiles move quickly at first, then slow them down gradually.

▶ Make your debris rotate as it flies through the air. Small objects should be spinning
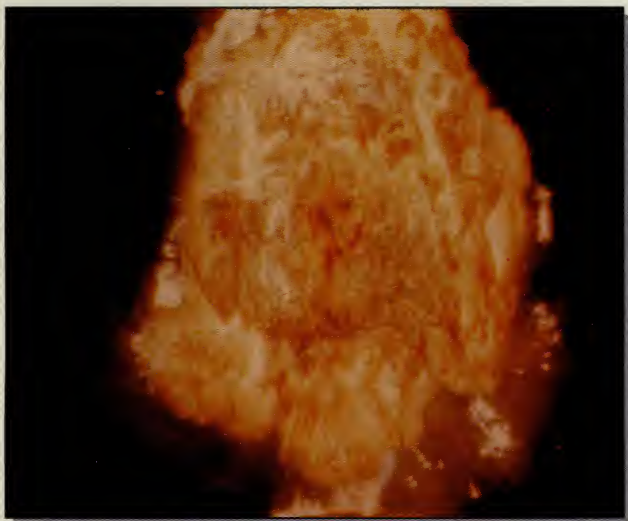
Figure 5. *Pyromania!* features large explosions perfect for virtual building eradication.

quickly, while large objects may only turn a few degrees.

▶ Have some of your hi-res debris appear to strike the camera or pass close to it.

▶ Consider applying some of the *Pyromania* maps to the debris. This can make it appear as though the debris is burning as it flies through the air.

You can create the explosion's fireball a couple ways. One is to create a polygon near the center of the blast area, then map the appropriate flame footage onto it. Take care that the timing and length of the footage matches your lighting and mesh animation or vice versa. Another method is to make a bright, fiery sphere that gradually fades out as it expands, or model an object that has numerous spikes all around it and use it in the same way, allowing it to follow some of the debris and consume other portions.

What usually follows an explosion? Fire, of course.

Where There's Fire, There's Smoke

Explosions typically have a beginning and end that tend to be close together. Fire and smoke tend to go on for long periods of time. In fact, if the scene is a long one, the effect will probably need to be looped. Looping video footage can be accomplished by a simple cross-fade or a fancy, time-consuming morph. Fortunately, several of the fire effects in *Pyromania* are already looped (see Fig. 6).

The mesh techniques discussed with regard to explosions are also useful for fire and smoke effects. You want to see crumbled walls, blackened pipes, and I-beams jutting out of your buildings, that sort of stuff. Placing a few smoldering pieces of debris in the foreground helps, too.

The same goes for lighting, with much of your illumination coming from animated lights in the center of the conflagration. The lights should be set up to vary in illumination fairly quickly to cast a flickering effect on the surrounding area. You may want to make an animated projection map from a close-up of the flame loop and cast that over the area as well.

Consider positioning sev-

Figure 6. "Bottom Fire" is one of three fire loops from *Pyromania2*.

eral polygons mapped with flame and/or smoke effects in front of and behind various pieces of mesh. This gives the fire more depth and realism. Scaling the polygons creates the illusion of a mixture of large and small blazes. Be sure to offset the start points of the loops so all fires are not burning in sync.

If you need a quick and dirty fire or smoke effect, create a few maps in Photoshop of the effect in slightly different positions. Apply the first map to a flat polygon, and set the opacity to drop out everything but the fire or smoke itself. Duplicate, then rotate the polygon on its vertical axis 5 degrees to 10 degrees and then apply the second map to the new polygon. Repeat this, varying the maps, until you have something that looks like a cylinder made up of flat vanes. Light the assembly from below and rotate it during the animation. The effect works something like a Zoetrope, with the polygons revealing slightly different maps as they turn.

To cut rendering time or improve the effect, you may want to save this sequence as an animation with an alpha channel, then modify it with a paint or 2D animation program and apply it to a single polygon in your project. Also try moving the polygon up slowly to give the impression that the smoke is rising. The effect is not as good as using the smoke effects found in *Pyromania* (see sidebar, p. 95), but it will work in a clutch or for a very brief shot.

The Dogs of War

We've really done some serious damage this time out, but it's for the better. Naturalistic effects (even destructive ones) help to take the characteristic hard edge off 3D graphics and help to suspend the viewer's disbelief. Next time around, we'll take an in-depth look at what may be the single most important aspect of creating a stunning model: the mapping! No more smooth/clean/plastic renders for you, pal. It's time to get your hands dirty. Until then, keep your feet on the ground and keep reaching for the power switch. ❦
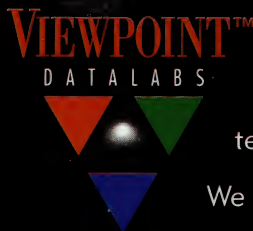
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